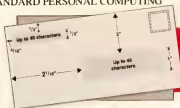


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MAGAZINE**VOLUME 7 NUMBER 22  
DECEMBER 27, 1988

## How Far Can These Packages Go?

- Professional Text Wrap
- Long Documents
- Multiple Column Widths
- Hi-Res Graphics
- Color Separations
- 6 x 20 MHz: PC Labs Tests the Fastest 286s Ever
- EISA vs. Micro Channel: Should You Choose? Should You Care?
- Apple's Pricey PC-to-Mac Connection

**Free Pop-up Utility  
Addresses Envelopes  
on Your LaserJet**

# Power Publishing



# What you've been doing.



*On your 286,  
you've been making any task look complicated.*



*On your 386,  
it hasn't been incredibly exciting having all that power.*

If the screens on the right look more intriguing to you than those on the left, you're ready for Microsoft® Windows.

Windows opens up the world of visual thinking to all 286 and 386 owners by offering the power of graphics.

Everything you can do on your PC, you can now do better, faster and with greater imagination. Whether you're creating documents or trying to get a clearer picture of your work.

What used to take complicated keystrokes can now be accomplished with the simple click of a mouse. With Microsoft Windows, you access pull-down menus. Simultaneously work with different programs as well as cut and paste between them to create graphic examples within different bodies of text. And what you see on the screen will appear on your printed page.

And once you've learned Microsoft Windows, you'll have the basis for scores of other programs because all the countless new Windows applications are based on the same easy, logical format.

Since Microsoft Windows virtually looks and works like MS® OS/2 Presentation Manager, you won't have to worry about it becoming obsolete in a couple years. We made both systems compatible. So, in the future, you'll be able to share

data between them. And your knowledge of Windows will give you a jump on learning MS OS/2 Presentation Manager.

You'd expect a program this powerful to require a more powerful machine. But we consistently create software that makes

*Stop playing with ancient instruments:  
Now cutting and pasting is  
a simple point and click  
with the Microsoft Mouse*

# What you could have been doing.



With Windows/286,  
you could have been seeing things much more clearly.



With Windows/386,  
you could have been seeing a lot more things much more clearly.

the best use of your present hardware.

For example, Microsoft Windows/286 will work with as little as 640K and instantly make your machine more sensitive, intuitive and highly visual. It gives you the ability to run every Windows application available.

And with access to all those powerful programs, you'll be able to extend the life and usefulness of your 286 well beyond the introduction of MS OS/2 Presentation Manager. With version 2.1 you also get the benefit of increased speed. So you'll blaze through Windows applications up to 87% faster.

Microsoft Windows/386 will give you everything that Windows/286 gives you. Plus multitasking with most DOS applications. Now you can finally utilize the speed and power of any 386 machine.

Imagine creating a complicated spreadsheet. Then while a macro is being run, open up a word processor. Type a document, open and work with a graphics program. Cut and paste between programs and even call up electronic mail. And still be able to check on the status of your spreadsheet at any time.

Considering all you can do with Microsoft Windows, you have only one question to ask yourself.

What have you been doing without it?

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- 101-key enhanced keyboard
- 80387 math co-processor socket
- 8 expansion slots

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- Ports: 2 serial, 1 parallel, 1 game
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- Clock/calendar with battery backup
- 101-key enhanced keyboard
- Award BIOS
- 80387SX math co-processor socket
- 8 expansion slots

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**\$1,295**

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- Ports: 2 serial, 1 parallel, 1 game
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- 101-key enhanced keyboard
- Phoenix BIOS
- 80287 math co-processor socket
- 8 expansion slots



## 286/12

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- Phoenix BIOS
- 80287 math co-processor socket
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VOLUME 7 NUMBER 22

# WHAT'S INSIDE



Design director Gerard Kunkel: PostScript programmer, electronic design trendsetter, and desktop publishing wiz. In short, an artist whose hands never get dirty.

As you might imagine, desktop publishing is a topic of much conversation at *PC Magazine* since we're always looking for ways to speed up and streamline our editorial process.

That's why it was only natural that in preparation for this issue's cover story on desktop publishing we turned to one of our own staff members, Gerard Kunkel, for guidance and advice. Kunkel, who is fluent in the disparate languages of graphic design, publishing, and PostScript, has led the way in transforming *PC Magazine's* art department into a PC-based design studio where high-end 386 systems outnumber T-squares and pens. In fact, so much of *PC Magazine's* graphic art is PC-generated that we had to give Kunkel's domain a new name: the design and electronic publishing department.

Our graphic artists use a special PostScript program developed by *PC Magazine* to create the charts used throughout the magazine. These charts and other art elements are then imported into a desktop publishing program for final page composition and the selection of typefaces and point sizes. The Pipeline pages in First Looks, the technical diagrams, and all of the 3-D benchmark-test charts you see in the magazine are electronically generated in this manner. Kunkel would like to do

much more electronic page design, but PC-based systems still don't have all the features necessary to design *PC Magazine* from cover to cover.

It was 2 years ago that the graphic artists first began using desktop publishing tools to eliminate the time-consuming chore of paste-up layout. Kunkel estimates that since then, *PC Magazine* has saved \$300,000 (as well as countless hours of labor). Back then, it took 3 days to produce one of our complex 3-D benchmark-test charts by hand. Today, the same task takes just a few hours to complete. "It's an indispensable help to be able to make changes on the fly and then see those changes displayed on the screen immediately," Kunkel says.

Kunkel is quick to add an important caveat. The same flexibility that makes desktop publishing so inviting is also its greatest danger. "Putting the entire page design system into the hands of one person can lead to disaster if an artist changes text or a writer fiddles with the graphics."

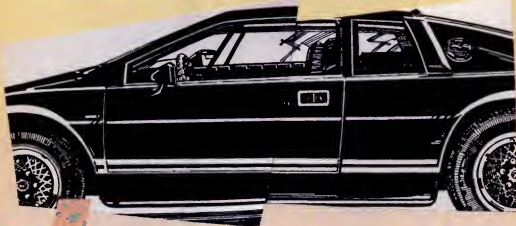
So far, however, everything's gone smoothly, and in our eyes, desktop publishing programs are like Xerox machines or modems. They still aren't perfect, but looking back, we wonder how we ever got along without them.—Stephanie Izarek and Donald P. Willmott

PC Magazine: The Independent Guide to IBM Standard Personal Computing (ISBN #0890 8707) is published bi-monthly, except once a July, and begins for one year (\$59.95 for one year (\$2 issues) \$64.95 for two years, and \$69.95 for three years. Additional postage: \$3.00 per copy or \$27.00 per year for U.S. orders and all other foreign countries. All Times Publishing Co.—a trademark of Dell Computers, located at 100 Park Ave., New York, NY 10018. Second Class postage paid at New York, NY 10018 and at additional mailing offices. POSTMASTER: Address changes to PC Magazine P.O. Box 999, Boulder, CO 80502-0999.

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*These unretouched print samples show the superior print quality of QMS-PS 810 over printers using first-generation print engines.*



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The new QMS-PS<sup>®</sup> 810 can compose and print the most complex pages in record times, with richer, more saturated blacks than ever before. All with the desktop publishing power of Adobe PostScript<sup>®</sup>, and the superior print know-how of QMS, an industry leader.

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**Fast start, strong finish** You can adorn your documents with one or all of the 35 Adobe typefaces. Thanks to PostScript, there's an infinite number of font variations available. You can also make type as large or as small as you want. And put it anywhere on the page. In fact, with PostScript you enjoy total control over the design of your page. It gives you the complete desktop publishing power to do things that would otherwise be virtually impossible. So you get high-quality output exactly how you want it.

Along with PostScript, the HP LaserJet<sup>™</sup>, Diablo<sup>®</sup> 630 and HP-GL<sup>™</sup> printer emulations are added for your non-PostScript software.

The QMS-PS 810 laser printer is easy to use, maintain, and comes with a one-year warranty. It's available from Laser Connection dealers. Laser Connection is a sales and marketing subsidiary of QMS. For the dealer nearest you call 1-800-523-2696.

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**Luisa Simone/** High-end PC-based desktop publishing programs are closing the gap with professional publishing systems. Users are demanding a full palette of design features, plus stunning output, ease of use, and absolute compatibility with dozens of file formats. Do *Legend*, *PageMaker 3.0*, *The Office Publisher*, and *Ventura Publisher 2.0* meet those expectations? ..... 89

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processor  
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Personal Publishing

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- William Harrington  
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- Christopher O'Mall - Personal Computing

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is a superior value." - InfoWorld

- Jim Seymour, PC Comput

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CIRCLE 506 ON READER SERVICE CARD



# Any cell can contain a complete other spreadsheet that you can access with a single key.

Fig. 1 Let's get the detail on those ad costs. Press one key, the Grey + key.

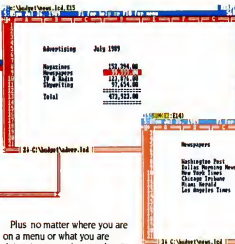
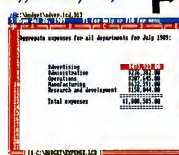
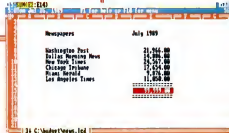


Fig. 2. Want to see the detail on Newspapers? Just move to that number and press Grey +.



## What Makes Lucid® 3-D So Special

In the screen examples you can see Lucid® is really three dimensional. Any cell of the spreadsheet can contain a complete other spreadsheet that you can access with a single keystroke. It is as simple as the pictures show. And you don't have to write formulas to do that.

All you do is go look at the other file, navigating through easy, point and shoot directories. When you come back up (with one key!) the link is made automatically for you.

Everything about Lucid® works that way. Users say "It is so intuitive that I really don't need a manual." That's because we use something we call a visual command menu. Jim Seymour, the noted PC columnist, talking about Lucid® in a recent article said that, "If there ever was an interface idea so good it ought to be stolen and widely used, this is it."

What he was talking about is a new menu approach that follows a simple design concept: it is easier to recognize than it is to remember. As choices are made on a menu that take you to lower levels you always can see exactly where you came from and where you are going. The complete menu path is always visible. You cannot get lost several levels down. This means you never have to remember a command, you just flow right to it.

Plus no matter where you are on a menu or what you are doing, just press function key F1, and you will get a help screen specific to that command or action. Or if you want to know about any subject you can pop up an index of over 600 topics and select the one you want.

## Notepad Behind Every Cell

Another 3-D feature is that any cell can also contain a multiple page note that you instantly access with a single keystroke. You can write notes, memos or letters that relate to your work, save them as individual files and even print them separately or with your spreadsheet.

"I've been calling it an 'Everyman's Spreadsheet', and I think that's how the market will position it. It's much more than an inexpensive alternative to 1-2-3."

Jim Seymour, Columnist, PC Magazine, PC Week

## Speed

Lucid® 3-D™ is truly revolutionary. It is fast, fast, fast! It is incredibly quick in performing calculations because it doesn't recalculate every cell every time you insert an entry. Instead, it only recalculates the specific cells that are affected by your change. This is called minimal recalc. Lucid® also has a remarkable innovation called background recalc in which you are given control of the cursor the moment calculations affecting your viewing

screen are completed. Other calculations you don't see continue on in the background during the next commands. The end result of this powerful combination is you rarely wait for a recalculation with Lucid®. You find out what instantaneous is all about.

## Lucid® Learns

Lucid® 3-D™ also lets you teach it in any combinations of keystrokes so that involved sequences can be done with single keys. Plus more than just remembering keystrokes, Lucid® allows you to create Macros with loops, procedures and conditional branching amazingly all done automatically with simple menus. You can create your own menus that show the new features you have taught it. Another great feature is you can make your custom menus work like Lucid®



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Name for: Robert Smith

Designed are my estimates for the June 1988 Budget.  
Please take a look at them, and see if they agree with your  
requirements.

Expense Budget June 1988

	1988
Advertising	1,794.00
Administrative	
Operations	
Manufacturing	
Research	
<b>Total</b>	<b>1,794.00</b>

Get back to me as soon as possible.

Thanks,

James Johnson

Look! Lucid does multiple windows.  
Notice: different drives, directories,  
down many 3-D levels. All at the  
same time!

Here, we popped Lucid up over Word  
Perfect. Then we pumped those figures  
into a letter on-the-fly with the Clipboard.  
Click, click—that quick!

where one choice can take you down a  
level to a whole new set of choices.  
What's nice is that they will work from  
one spreadsheet to another.

### Mouseability

Lucid® 3-D™ was designed for both key-  
board enthusiasts and mouse lovers  
alike. You can take your pick. Designed  
around the mouse from the ground  
up, the interface is smooth and natural.  
You select files to load from directory  
lists. Everything is point and click. What's  
more, any Lucid® 3-D™ menu selection  
can be "moused" and the  
response time is "right now" instead of  
the sluggish "a little bit behind you" feel  
of add-on mouse menu systems like  
those you've seen with 1-2-3.

A window pops up with a library of  
function names you can page through  
with the mouse. Select, click and it's  
in the formula with no typing required.  
You even have a label window that you  
can fill (from the keyboard) with favorite  
labels and names so that you can insert  
them later with the mouse. There's even  
a pop-up calculator to insert numbers so  
you don't have to go to the keyboard  
very often.

It really permits that feeling of  
becoming one with your work. Lucid  
3-D™ has windows of user defined range  
names as well as the macros named by  
the user that can be selected just by

pointing and clicking. Icons that are easy  
to grab with the mouse let you resize  
and move the spreadsheet window with  
the ease you would expect. Plus you can  
go anywhere on the sheet by moving the  
mouse and clicking on the spreadsheet  
borders. And remember, Lucid® is  
designed so that any of those features  
are done with or without the mouse  
easily and quickly.

### Audit

When you are staking a big decision on  
information gained from a spreadsheet  
you need to be certain that you have  
made no mistakes. Lucid® 3-D™ offers  
five audit displays and printouts.

Even if you don't plan to abandon  
1-2-3, Lucid® makes sense. Files are

converted between them with ease so  
there's not an interoffice compatibility  
problem. This means you can have the  
power and fun of Lucid® 3-D™ without  
having to upset your present systems.

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## Bon Appetit Electronic Cookbook

Here's some software that really cooks! Bon Appetit Electronic Cookbook provides you with an extensive collection of delicious recipes. You can add old family favorites too. Easily accessible for the inexperienced computer user.

**\$31**

*T.W.*

During the holidays, T.W. Dillo is always cooking up something special. Whether it's bite-size taste treats in the kitchen or bite-size goodies in the workshop, he follows time-honored family recipes.

"IMS computers are prepared the same conscientious way I prepare Aunt B.Z.'s delicious pumpkin pie—one step at a time," insists T.W. "Quality checks replace licking the bowl. Every drive is burned in; every system tested. Of course, I try not to burn at my pies," adds T.W. with a wink.

If there was a computer cook-off, the competition would have it rough. They'd find it difficult to duplicate the armadillo aptitude for craftsmanship. "But then," quips T.W., "it's like what my father, of D.P., used to say, 'If you can't take the heat—you shouldn't be in the kitchen.'"

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- Illustrated installation and operations manual
- Clock/calendar with battery backup

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- Dual diskette drive/ fixed disk controller

- 200-watt power supply
- Enhanced, 101-key keyboard
- Illustrated installation and operations manual
- Clock/calendar with battery backup

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- Enhanced, 101-key keyboard
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# LETTERS TO PC MAGAZINE



## BACKING A WINNER

What does it take to be selected as Editor's Choice? In the "Counterpoint" to the article "Take It or Leave It: Portables with Desktop Power" (*PC Magazine*, October 11, 1988), Bill Machrone stated, "My



personal favorite among these machines is Zenith's SupersPort 286."

Is it a game of semantics that the editor's favorite product is not also the Editor's Choice?

Jason Weston  
Los Altos, California

*Editor's Choice is a collaborative judgment that is made by all the editors involved in a review. I would not presume to foist my personal opinions on every product review that we publish. That's what our "Counterpoints" are for.*

—Bill Machrone

## WHO NEEDS RELIABILITY?

For most buyers, Jim Seymour's priorities are baloney! ("A PC Priority Checklist," *PC Magazine*, October 11, 1988). The most important consideration when purchasing a computer is compatibility. The second concern is cost, and the third is appearance.

Computers being made today are so dependable that no buyer even considers reliability. Why else do you think all those PC

compatibles have such popular appeal?

Jack D. Flanders  
Mount Clemens, Michigan

## COVERING ALL THE BASES

Your "test to the spec" approach to LIM 4.0 boards was refreshing ("Leveraging RAM with LIM 4.0," *PC Magazine*, October 11, 1988). It was very disappointing, however, to see so little consideration given to the integrity of the hardware.

John A. Murphy  
San Antonio, Texas

In "Leveraging RAM with LIM 4.0," Winn Rosch's statement that "all existing LIM 3.2 and EEMS programs will run under the LIM 4.0 standard" is simply not true. One very popular application, *Microsoft Excel*, Version 2.0, will use only LIM 3.2 memory that is mapped into a continuous 64K window.

Harry J. Saal  
Mountain View, California

## SPEED ADDICTION

Not all your readers are interested in a continual search for the Holy Grail of more speed, prettier colors, and extra bells and whistles. I don't need to hear that any equipment over 2 months old is old-fashioned and unhip. I do need information on how to use computers as tools to expand power and efficiency.

Sure, I'm mildly curious about what's new and exciting out there in hardware land, but I'd rather feel that *PC Magazine* was offering me prudent and realistic ad-

vice, not just promoting the latest toys on the market.

Steven Bussard  
Glendale, California

## TRIED AND TRUE

I am a faithful reader and promoter of your biweekly tome and I recommend *PC Magazine* on a regular basis to all the Army chaplains and other personnel whom I work with at Fort Jackson.

With the rush of 286 and 386 technology, it would seem that the 8 million 8088 PC users have been left to fend for themselves. Surely among these lonely 8 million users there is a real need for ideas, restructured systems, and software tricks for those of us who cannot afford the cash outlay to upgrade just yet.

Rev. William McCoy  
Fort Jackson, South Carolina

## SCHOOLING DVORAK

John C. Dvorak's reference to the "poor school districts in the rural South" (*Inside Track*, *PC Magazine*, October 11, 1988) represents a type of prejudicial journalism that has no place in our society.

I grew up in the North; some of the poorest school districts in the country are located in the Ohio Valley where I went to school.

Albert E. Capito  
Baytown, Texas

## OKIDATA RECALL

Okidata, through continued testing of its product line, has discovered a potential safety hazard in the Microline 320 and 321 printers. A mandatory retrofit program has been put into effect in which Okidata, at its own expense, will upgrade all of its inventory, the inventory of its distributors, and

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- 201- Log bank transactions, produce financial reports w/CheckIt
- 226- (2 disks) File Express menu driven all purpose database mgr.
- 232- (2 disks) Friendly Dr. Data mail mgr. is easy-to-use 640K.
- 234- Control & update inventory w/Mini-Master; know daily levels.
- 267- Add special charts, line graphics to w/word processor w/QL
- 316- Manage clients, sales prospects w/Tracker 512K, h/disk.
- 319- (2 disks) Keep appointments, update agendas w/EdDesk.
- 337- Analyze your credit charges, payments, interest w/Charge!
- 363- Track yr portfolio, get weekly reports w/Mutual Fund Mgr.

## EDUCATION

- 186- It's painless learning DOS w/interactive DOS Tutor.
- 191- Learn music, US states w/PC-quizzes, song lang. demo.
- 226- Build dazzling typing speed precision w/PC-Type 640K.
- 257- Graphic mathematical puzzle game makes learning fun!
- 396- It's simple to keep, average student grades w/GradeSheet
- 376- Teachers & students can summarize grades w/GradeIt
- 394- (2 disks) XY-See graphic math for HS & college students.

## GRAPHICS

- 58- Display hi-res 3-D molecular structures w/ChemView EGA.
- 140- (2 disks) Paint, draw w/Fingerpaint, design w/Almanac.
- 210- (2 disks) Create advanced 3-D designs 640K, h/disk.
- 285- (2 disks) Produce grad 3-D images w/Surround graphics.
- 352- (2 disks) Edit graphics, colorize pics w/VGACat VGA.

## GAAMES

- 15- Blizzken game tests knowledge of Bible figures;verses.
- 23- Star Trek, Ohw! board game, antillary bombing EGA.
- 26- Play Backgammon, or Wordplay (like wheel of fortune)
- 84- Three solitaire card games: Spider, Klondike, Canfield
- 121- Outpost, Pango, Centipede, Hopper (K Frogger), mental
- 151- Hawk puts you & buddy dog in a wild adventure (K Rogue)
- 176- Destroy enemies w/Striker, conquer the world in Rank.
- 215- Solve, create own word puzzles with Phrase Craze!
- 289- 3-D Pacman, Kang, Spacewar, ABM (mistle drill).
- 309- Backpack (you set rules), ArmchairAS, mental war.
- 321- Star Trek, the original Colossal Games adventure, more.
- 365- (5 disks) Create your own art adventure games. 384K.
- 372- Precut, Ohw! Dragons, Sapphires (fly one), battleship.

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- 138- Packed w/print utils for print spooling, banners, fonts, etc.
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- 31- Move Database files 4000+ files available on videotape.
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- 146- PC-Lotto helps you mathematically beat the state lotto odds!
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## VIEWPOINTS

## LETTERS

the inventory of its resellers. Also, Okidata has asked its end users to bring their printers to one of the company's many authorized service centers so that they, too, can receive the upgrade.

We will maintain a "hot line" at Okidata to answer any questions you may have. The contact is Ms. Arden Colace at (609) 235-2600, extension 8589.

Dennis P. Flanagan  
Sr. Vice President  
Okidata Corp.  
Mount Laurel, New Jersey

## STRIKE FOUR

On the basis of your First Looks review, I foolishly installed IBM DOS 4.0 on the computers in our medical department ("OS Who? IBM DOS 4.0 Brags New Look, Long-Awaited Features," *PC Magazine*, September 27, 1988).

What a bunch of unhappy people that produced! Lotus add-ons would not run, nor would QDOS. Monthly reports were delayed, and valuable time was wasted on file and utility management. I had to reinstall DOS 3.3 so that I could return to taking care of patients.

I am shocked that the most popular journal for noncomputer nerds would list its readers down like this.

William A. Stone  
Pittsburgh, Pennsylvania

## DANGER—HIGH ALTITUDE

The use of the term "yahoo ignorance" in Bill Machrone's column "Benchmark Bluster," (*PC Magazine*, September 27, 1988) disgusts me. I am fed up with the arrogance that *PC Magazine's* columnists exhibit from time to time. They make it sound as if the only people who know anything about computers and software are the staff members of *PC Magazine*.

Get off your pedestals! Not only can the high altitude cause nose bleeds, but breathing all that air from the ozone layer is dangerous to your health.

Raymond Kostany  
Wood-Ridge, New Jersey

## IMPROVING ON A GOOD THING

The Chang-modified 286 circuit does sound incredibly fast (Inside Track, *PC Magazine*, September 27, 1988), but I am more pleased to see that some people are searching for new and imaginative ways to use current technology.

This industry is growing so fast that instead of improving equipment, it sometimes seems that we are simply developing larger units with the same problems.

Robert Meloche  
Saint-Laurent, Quebec  
Canada

## WEIGHT CONTROL

After lugging a Toshiba T1100 Plus around for 2 years, I believe that weight, rather than desktop functionality, is what portability is all about. To restore some meaning to the word portability, I think that the editors of *PC Magazine* should apply some realistic descriptions to the various weight levels now available in so-called portables.

First, rename the category "Integrated PCs." Second, set up standards to reflect the degree of portability for Integrated PCs, such as portable, luggage, jobsite, or strictly desktop.

David A. Evans  
Park Ridge, Illinois

## A NEW BREED OF PRINTER

I'm tired of hearing so much about the marvels of the Hewlett-Packard DeskJet (with the reviewers' attendant apologies for performance and quality). Why is everyone acting as if HP is the only producer of an ink jet?

I've used my Epson SQ-2500 ink jet for a year. It's an excellent product, and I don't have to worry about Epson compatibility!

Don Ellis  
Causeway Bay, Hong Kong

## EXTRA CREDIT WORK

I had never used DEBUG, partly because I didn't really know what it did (*PC Tutor*, *PC Magazine*, September 27, 1988). After sitting down and working through your tutorial, I now feel comfortable that if I ever do need to use it, I will be able to do so.

Robert M. Redding  
Coronado, California



# THE BUS STOPS HERE!

## CompuStar: PS/2 and PC/AT Compatibility.

Ask any computer expert about what type of system you should buy nowadays and you'll likely get a "pass the bus" response. Something like — "Well, uh, the PC/AT\* bus is your best buy but, then again, the new PS/2\* bus may become the next industry standard." Great advice, right? If trying to decide on a microprocessor weren't tough enough, now you're expected to pick a bus, too.

### RELAX, NOW THERE'S COMPUSTAR.

The all new CompuStar from Wells American not only lets you interchange microprocessors, you can also mix and match buses — a PC/AT bus, a PS/2 bus or... both. As your computing needs change, simply snap in a new processor or add an extra bus. You'll never again have to worry about buying the wrong computer system!

### FOUR COMPLETE SYSTEMS IN ONE.

The CompuStar can be configured with any of four microprocessors — an 8086, an 80286, an 80386SX, or an 80386. The processor and up to 16 megabytes of user memory have all been combined, using the latest VLSI technology, on a single, plug-in CPU module. Plus, any time during the first year of ownership, CompuStar users can "trade-in" the CPU module they initially selected toward the purchase of any of the other more powerful modules. Nobody but Wells American gives you this kind of value.

### A CONVERTIBLE BUS? YOU'RE KIDDING!

No, we're not. In fact, it may well be the most practical microcomputer innovation ever. Say you've selected an AT compatible CompuStar and later want to add PS/2 compatibility. No problem! Snap in a PS/2 Bus and Adapter Module and you can use both buses in the same system. Likewise, if you've selected a PS/2 compatible CompuStar and decide you want to add an AT bus, just snap in an AT Bus Module. Depending on configuration, the CompuStar can have up to 13 bus expansion slots — all AT slots, all PS/2 slots or a "split-bus" of AT and PS/2 slots. No matter which bus becomes the next industry "standard," you'll have peace of mind knowing your investment in a CompuStar will be protected.

The CompuStar is also easily expanded. That's because there are seven CompuStar disk/tape compartments — six accessible from the front and an additional full-height bay inside. All this in a sleek, compact tower design that will leave more room on your desktop than any of the so-called "desktop" models.

### A NEW IDEA FROM AN OLD COMPANY.

The CompuStar® Multi-Processor, Convertible Bus™ Microcomputer. It's no surprise that our engineers invented it. After all, we've been making microcomputers longer than anyone else... even longer than IBM! And if that kind of experience doesn't impress you, CompuStar's service programs surely will. You can select an optional overnight module swap-out plan or on-site service from General Electric Corporation — one of the most respected names in consumer electronics. And, of course, every CompuStar carries a full one-year factory warranty.

### FINALLY, AFFORDABLE TECHNOLOGY.

Think all this technology sounds expensive? It's not. CompuStar 20MHz 80286 systems start as low as \$1995†. There are also inexpensive 8086 and powerhouse 25MHz 80386 systems available. Plus, there is a wide variety of CompuStar display, tape and disk options including a one gigabyte erasable optical disk. You can choose a factory pre-configured CompuStar or custom design one yourself.

Just unlock the front panel and literally "snap-in" a bus, CPU, memory or disk module in a matter of seconds. It's system flexibility never before available... at any price.

While one of our competitors (we won't mention any names) threatens you with "missing the bus," most simply pass the bus. Our new CompuStar, however, eliminates the bus problem altogether. Not to mention the processor problem. Even the expansion problem. Prove it to yourself. Call today about our 31-day trial offer. Oh, and by the way, the next time anyone asks, tell 'em you know where the bus stops.



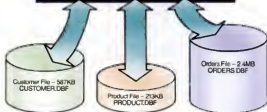
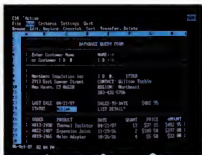
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\*Personal Computer AT, AT and PS/2 are trademarks of International Business Machines Corporation. †Photographs depict optional equipment. A complete price list is available upon request. CompuStar 80286 system (\$1995) includes an AT Bus Module, built-in VGA/EGA display, adapter, one disquette drive with controller, two serial/parallel mouse port, keyboard and 220 watt power supply.

CIRCLE SIX ON READER SERVICE CARD



# dBASE Power for 1-2-3

Last year we met a crazy programmer who said he could build a database with the power and capacity of dBASE and put it inside 1-2-3. Well, he works for us now, and if you know anything about database programs, his baby is going to knock your socks off.

Introducing @BASE, a full-feature relational database add-in for 1-2-3. Now anyone who knows how to use 1-2-3 is an instant database wizard because @BASE turns 1-2-3 into a powerful "front-end" for database applications. *It's as easy as 1-2-3.*

## Huge capacity

If you've ever tried to use 1-2-3 as a database manager, there's a good chance you've run out of memory. That's because 1-2-3 stores data in the worksheet. @BASE stores data on disk where record capacity is virtually unlimited. You'll never run out of memory again.

## Brains and brawn

@BASE compares with powerful standalone database programs like dBASE or R:BASE,® but it operates in concert with 1-2-3. You get the best of both worlds. 1-2-3 gives you tools for data analysis. @BASE gives you big data capacity. Brains and brawn. It's a nice combination.

In minutes you can build a worksheet with dynamic links to the database on disk. (The worksheet might present a sales recap by region.) Next month, for up-to-date results, simply

load and recalc the worksheet. Fresh database information is automatically linked from disk.

## Industry-standard file format

@BASE uses exactly the same file format as dBASE III and dBASE III Plus. dBASE is not required to use @BASE. But if you have standardized on dBASE, @BASE fits right in.

@BASE reads and writes dBASE files directly. No conversion is necessary.

At less than a third the cost of dBASE, you may decide to use @BASE instead of dBASE throughout your organization wherever users need easy access to dBASE information.

## Serious Performance

@BASE beats dBASE III Plus in benchmark tests. \* @BASE is up to 3.7 times faster!

	dBASE III Plus	@BASE
Locate record	12 sec	12 sec
Sort database	7.1 min	1.9 min
Sort database	10.8 min	4.5 min

\*Test with 4,000 records, 34 fields per record

@BASE works with 1-2-3 Release 2 on the IBM PC, XT, AT, PS/2 and compatibles. Only \$195. No competing add-in database can match @BASE for power, compatibility and performance. *Nothing even comes close.*

CIRCLE 143 ON READER SERVICE CARD

## Introducing @BASE (pronounced "at base")

@BASE™ puts the power of dBASE III Plus® inside 1-2-3.®

With @BASE you can:

- Instantly transform an on-sheet database to a dBASE-compatible database on disk.
- Use 1-2-3 as a "front-end" for existing dBASE applications.
- Build a complete database application from scratch using 1-2-3 to control database functions.

## @BASE Features

- Huge capacity - data is stored on disk.
- Occupies only 72K RAM + 8K per open file.
- Fully compatible with dBASE III file format.
- Flexible data structures:
  - Table view
  - Form view
  - Crosstab view
- Powerful Query: Selection commands.
- Bi-directional data transfer between worksheet and database.
- Dynamic link between worksheet and database using new database @ functions.
- Fully compatible with 1-2-3 macros.
- Multi-level sort (ascending/descending).
- Global multi-field search and replace.
- Create / modify database definition.
- And much much more!

You can open, access and update multiple data files concurrently using special @ db functions. An optional module, available soon, lets you "join" data files on one or more common fields, and support index files. Option price is \$89.95.

# @BASE™

Please send me:

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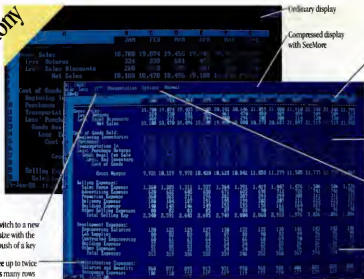
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and Symphony



1/refreshed photo of EGA display

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With SeeMORE™, a remarkable add-in program for 1-2-3<sup>®</sup> and Symphony<sup>®</sup>, you can instantly double, triple or quadruple your view with the push of a key.

worksheet. You don't need to exit and switch to a new driver set!

Works with 1-2-3 Rel 2 and 2.01 or Symphony Rel 1.1, 1.2 and 2.0 on the IBM PC, XT, AT, PS/2 and compatibles. All you need is a simple graphics adapter: CGA, EGA, VGA, MCGA or Hercules. Also looks great on Compaq and Toshiba gas plasma. Not copy protected. 1-2-3 version \$79.95. Symphony version \$99.95. Get SeeMORE and expand your horizons.

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Small	106x33	128x43	106x48	120x43	128x50
Very Small	128x43	160x51	128x55	144x43	N/A
Tiny	128x33	160x58	160x60	180x58	160x66
Presentation	40x25	40x25	40x34	45x25	40x28

SeeMORE lets you build a twelve month forecast without stopping to scroll left and right. All twelve months appear on the screen. SeeMORE gives you the big picture.

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CIRCLE 282 ON READER SERVICE CARD

# The Cure for MacEnvy.



For years PC users have been conditioned to think of their computers in certain terms. Dependable. Versatile. Dull. To get superior graphics, some claimed that you need a different type of computer altogether. They said *their* computer was everything the PC wasn't. Easy to use. Graphically exciting. Fun. PC owners were, well, *green* with MacEnvy.

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a basic drawing program. And Micrografx software supports hundreds of printers like HP's LaserJet™ and PaintJet.™ All PostScript™ devices, too.

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## ■ LETTERS

## MORE DVORAK?

I would like you to give John C. Dvorak a raise! Even though John sounds like a user who craves power (as a kid, I am content with my underpowered machine), I can relate to him. If all the editors were like him, the computer world would be much more lively.

Ron Eisele  
Clutier, Iowa

## AN APPEALING USE OF DESIGN

I would like to compliment you on your excellent review of graphics packages



("More than Meets the Eye: Designing Great Graphics," *PC Magazine*, September 27, 1988). Your article demonstrated a realistic understanding of end-user needs.

Robert S. Vollowitz  
Agoura Hills, California

## A WORD FROM THE OTHER SIDE

What is John C. Dvorak implying by stating that "before the end of the year we'll know if Canada is serious about lifting trade barriers for products from the United States" ("Canada, O Canada," *PC Magazine*, October 31, 1988)? On the eve of the implementation of the "Free Trade Pact," what trade bill is being pushed through the U.S. Congress against imports from Canada?

In addition, how can he say that "Canadians aren't Americans"? Did he need a ship to travel from the good ole U.S.A. to get here?

Does he really think that we Canadians want to be part of the U.S.A. just to be "Americans"? Does he really believe that we would like to belong to a country that is one of the "richest" in the world yet is too poor to afford universal medical insurance for its people? Thanks, but no thanks.

Joe P. Kiene  
Sechelt, British Columbia  
Canada

Canadians are not hapless. We do not have a population of 250 million people, and therefore our marketplace is much smaller ("Canada, O Canada"). This fact causes our prices to be higher.

John C. Dvorak also refers to our fear of being Americanized, and he is right. We Canadians do guard our culture jealously—as we have ever since you Americans tried to invade our country in 1812. As to the culture of south Alabama not being affected for the last 200 years, I have been to south Alabama and wasn't aware that there was any to be affected.

The reference to the French language laws in Canada is, of course, typical of

■ Canada has guarded its culture jealously ever since America tried to invade in 1812.

American ignorance. It has always amazed me how little the citizens of the U.S.A. know about a country that shares 3,000 miles of border with them. Being able to speak French or English is every Canadian's right, and so it should be.

Let's face it, Mr. Dvorak. There are only two kinds of people in North America: those who are Canadians, and those who wish they were.

Wayne R. Hewitt  
Brantford, Ontario  
Canada

## CORRECTIONS/AMPLIFICATIONS

The correct number for Relisys printers is (408) 945-9000 ("Dot Matrix Printers: The Market Matures," *PC Magazine*, October 31, 1988).

## HOW TO WRITE TO PC MAGAZINE

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\*\* Custom configured systems may take longer

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† Add \$49 for 14" Flat Screen Monitor

## Swan 286/10

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- 101 Key Enhanced Keyboard
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- Swan Setup & Utilities Diskette

#### Options:

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## Swan 386/16

**\$1969** Monitor not included

### 16MHz/0 Wait State

Base System with 1 2MB Drive, Assembled & Tested IBM AT Compatible MS-DOS/5, OS/2® & UNIX® Compatible

- 80386 16/8 MHz Norton SI 17.6
- Phoenix BIOS
- 1MB (expandable to 2MB) RAM on memory card
- 80287 & 80387 Coprocessor Socket
- 200W Power Supply
- 1.2MB Floppy Drive
- Ports: 1 Serial, 1 Parallel, 1 Game
- Dual Floppy/Dual H.D. Controller
- 8 Expansion Slots
- 101 Key Enhanced Keyboard
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- Swan Setup & Utilities Diskette

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- Upgrade to 2MB
- 80387 Coprocessor
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Drive Options		Include Monitor & Video Adapter			
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\* Includes Single 360K Floppy Drive

## Swan 386/20

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- Phoenix BIOS
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- 80287 & 80387 Coprocessor Socket
- 230W Power Supply
- 1.2MB Floppy Drive
- Ports: 2 Serial, 1 Parallel, 1 Game
- Dual Floppy/Dual H.D. Controller
- 8 Expansion Slots
- 101 Key Enhanced Keyboard
- Clock Calendar w/Battery Backup
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#### Options:

- Upgrade to 2MB
- 80387 Coprocessor
- 312" Floppy Drive
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386/20		VIDEO OPTIONS			
Drive Options		Include Monitor & Video Adapter			
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## INFO WORLD

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## ■ JOE DESPOSITO

## PC ADVISOR

*Help with word processing in Greek, advice on producing 3-D graphs, where to find a PC expansion chassis, and assistance in locating a guide to PC software.*

**ALL GREEK TO HIM**

Is there a Greek-language word processor for correspondence—not scientific notations? One that uses the standard IBM key-board?

N. Sampson  
Darwin, Northern Territory  
Australia

*For word processing in Greek, I suggest you try the Greek language version of Nota Bene. Nota Bene comes with screen fonts for EGA/VGA and Hercules—including all the accents and breathings needed for classical Greek—and comes with printer fonts for LaserJets and high-end Toshiba and Epson printers.*

*A review of the English version of Nota Bene appears in the February 29, 1988, issue of PC Magazine. Nota Bene is full-featured, fast, and has an easily understood user interface. By the way, Nota Bene was selected as an Editor's Choice in that issue. Suggested retail price of the Greek version is \$590.*

*A less costly alternative is available from the MegaChomp Co. (3524 Cottman Ave., Philadelphia, PA 19149; (215) 331-2748), which sells a bilingual word processor called Duanglan that switches between English and Greek. To make the switch you simply press F2. And so that you'll know what you are typing, keycap stickers are provided with the package. There are two versions of the product, one that supports both dot matrix and laser printers (\$109) and one that supports just dot matrix printers (\$69).*

*Multi-Lingual Scholar from Gamma*

*Productions (710 Wilshire Blvd., #609, Santa Monica, CA 90401; (213) 394-8622) is another word processor that uses the Greek alphabet. This product supports Greek and other European languages in the same package. If you want, you can mix five languages on one line. Language changes are made through a Ctrl-function key combination. Another feature enables you to print from right to left as well as the conventional way. To facilitate typing, stickers are provided for keycaps. Alternative keyboards can be displayed on-screen by pressing Alt-F9 and are shown in the manual.*

*Multi-Lingual Scholar sells for \$350 with dot matrix support. Laser printer support costs an additional \$150.*

**PRETTY AS A BENCHMARK**

Can you please tell me what program is used to create the 3-dimensional graphs that illustrate your benchmark tests and

what other software is available that produces a 3-D effect.

Diane Brown  
Santa Clara, California

*The graphing program used by PC Magazine to illustrate its benchmark tests is a proprietary one developed by our director of design and electronic publishing, Gerard Kunkel. The software produces an EPS (encapsulated PostScript) file.*

*PC Magazine recently published its graphics blockbuster issue (September 27, 1988). The feature's table on pages 176 and 177 of that issue indicates which of the programs have a 3-D effect.*

*Both Editor's Choices in that issue can produce graphs with a 3-D effect. Harvard Graphics from Software Publishing (1901 Landings Dr., Mountain View, CA 94039; (415) 962-8910) has a suggested list price of \$495, and Graph Plus from Micrografix (1820 N. Greenville Ave., Richardson, TX 75081; (800) 272-3729) lists for \$395.*

*For high-quality output, consider connecting your computer to either a PostScript-compatible laser printer or a Linotronic typesetter. Since Graph Plus runs under Microsoft Windows, it supports PostScript printers. Micrografix also supplies a driver that allows owners of the QMS color PostScript printer to create color output. Harvard Graphics can output both PostScript and EPS files.*

*A program that creates the exact same kind of 3-D effect as the graphs in PC Magazine is Perspective Junior from Three D Graphics (860 Via de la Paz, Pacific Palisades, CA 90272; (203) 459-7949). The*

■ **For high-quality 3-D graphs, connect your computer to either a PostScript-compatible laser printer or a Linotronic typesetter.**

## ■ PC ADVISOR

*drawback of this program is that it does not include PostScript drivers. Suggested retail price is \$149.*

**HOPING FOR FURTHER EXPANSION**

My problem is that I have run out of expansion slots on my Leading Edge Model D PC. Is there anyone who makes an expansion box that would allow me to plug cards into it and then plug it into one of my slots?

G. M. Boyer  
Aurora, Colorado

*Many of the original IBM PC owners had the same problem as you, and IBM provided a solution with an expansion chassis. However, IBM no longer manufactures the expansion chassis, or that PC!*

*One company that does sell an expansion chassis is PC Horizons (1710-M Newport Circle, Santa Ana, CA 92705; (714) 953-5396). Called the PC-XTRA, it works fine with the Model D and other PC com-*

*patibles. The chassis sells for \$449.*

*One other way of regaining some slots in your PC is to trade out single function cards for multifunction ones. For example, if you have your floppy disk controller, parallel port, and serial port in separate slots, consider buying a board that integrates all of these functions on one card, thus freeing up two slots.*

**SEARCHING FOR SOFTWARE**

We are looking for a software directory that lists all the major software written for IBM PCs and compatibles. We would like a directory that categorizes the software by application with a brief description of the software package, its approximate price, its hardware and software (such as a certain level of DOS) requirements, and how it can be obtained.

Is such a directory available and if so, how can I purchase it? Our company buys, sells, and leases computer equipment, in-

cluding PCs, and our customers frequently ask us to recommend a software package for their individual needs.

Nancy Walk  
Ellisville, Missouri

*Ziff-Davis publishes a three-volume guide to the computer marketplace called Data Sources (Circulation Department, One Park Avenue, New York, NY 10016; (212) 503-5327).*

*Data Sources contains the type of information you want about PCs and most other computers, too.*

*The reference set, which is published twice annually, has an annual subscription rate of \$525.*

**ASK THE ADVISOR**

Send your questions to PC Advisor, PC Magazine, One Park Avenue, New York, NY 10016. Please specify your equipment. [E]

# SOUNDS FISHY!

## Improve The Brooklyn Bridge?

Yes! If you're talking about "The Brooklyn Bridge" Version 2 from White Crane Systems. It's the world's leading file transfer, printer sharing and file management utility. It works with all IBM compatible desktops, laptops and PS/2s. This is not just another fish story! The Brooklyn Bridge was chosen by John Dvorak, PC Magazine, as "The Best of the Best Utilities."

**No Aggravation:** The Brooklyn Bridge uses 1-2-3 style menus for the novice and DOS commands for the more experienced user. The menus are in a powerful file manager allowing you to view both local and remote files in a

full-screen, dual-directory display. Point-and-shoot operations provide easy disk navigation with over 100 functions like file tagging and sorting.

**User Choice:** The Brooklyn Bridge even gives you a powerful DOS utility package. These utilities let you work with multiple files on a single command line. They also provide you with fast, easy alternatives to the old hand-pump method.

**Save Money:** Access remote printers and other peripheral devices like tape back-up systems and plotters via The Brooklyn Bridge.

**Save Time:** Run tedious chores on your remote computer through The Brooklyn Bridge which equips you with dual independent processing power.

There's nothing fishy at all about White Crane's Brooklyn Bridge. It's packaged complete with an 8-foot Universal Cable, 5.25- & 3.5-inch diskettes and manual for just **\$139.95.** Desktop to Desktop™ 50-foot Universal Cables are available for **\$30.00.** See your local dealer or call White Crane Systems at **404-394-3119.**



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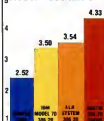
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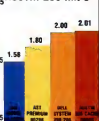
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## MIPS Test and Bottomline: Performance You Can Really Count On

5 AUSTIN 386 MIPS



2.5 AUSTIN 286 MIPS



AUSTIN 286-12.5 BOTTOMLINE

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One year on site service included	YES	NO	NO	NO	NO	NO
One year on site service included	YES	NO	NO	NO	NO	NO
Supports up to 4 MB of RAM on the motherboard	YES	NO	NO	NO	NO	NO
Supports 1:1 interleaving	YES	NO	NO	NO	YES	NO
6 layer motherboard	YES	NO	NO	NO	NO	NO
64K and 65536 cache	YES	NO	NO	NO	NO	NO
Built-in mouse port	YES	NO	YES	NO	NO	NO

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# FIRST LOOKS

## The Presentation Manager: Lively, Innovative, and RAM-Hungry

### PC HANDS ON

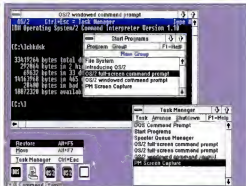
BY GUS VENDITTO

The apocalypse is here. The new age has dawned. Operating System/2 Standard Edition 1.1 has shipped.

Will computing ever be the same?

Even though it's been only a year-and-a-half since IBM announced this bold new plan to supersede DOS with a graphical, multitasking operating system (aka the Presentation Manager), the preconceived notions are legion.

IBM and its partner, Microsoft, have now quashed a large



The beginnings of an OS/2 1.1 session. You begin sessions via the Start Programs menu and switch sessions via the Task Manager.

measure of those premature criticisms by delivering, on time, an operating system and shell that are fast and responsive.

Still unanswered is whether the Presentation Manager (PM) will prove worth the extra hardware expense. Although virtually every major software publisher says it has PM applications in the works, OS/2 1.1 shows us only the outlines of things to come. Not even a calculator comes with OS/2 1.1.

I was able to test Version 1.1 with several character-mode OS/2 programs, but the only PM application now available to PC Labs is a screen-capture pro-

(continues on page 34)

## 3+ Open, LAN Manager: Fast, Innovative, and RAM-Hungry

### PC HANDS ON

BY FRANK J. DERFLER, JR.

OS/2 LAN Manager was developed by Microsoft and 3Com as a powerful, flexible core LAN operating system that others can add value to and sell. As the first LAN Manager implementation available through retail channels, 3+ Open LAN Manager demonstrates the potential of this operating system for growth and flexible interconnection.

The 3+ Open server software is an OS/2 application. OS/2 handles the filing tasks for the server, and the 3+ Open package includes a modified version of OS/2 for the server. But while 3+ Open runs under

OS/2 on the server, the client workstations on the LAN can run under either OS/2 or DOS. The 3+ Open server can be dedicated to that task or operate as both a server and workstation.

We evaluated one of the first shipped copies of 3+ Open. 3Com plans a second release of the software in 1989 that will include more features, such as electronic mail and management options. Even without those features, however, we found 3+ Open to be a powerful and flexible LAN operating system with great potential—and a hefty appetite for memory.

Our benchmark tests show that 3+ Open gives good performance. The speed records set by Novell's NetWare aren't in im-

mediate danger, but 3+ Open runs faster than all the other big-time LAN operating systems we've tested.

3Com and Microsoft built in an excellent printer-sharing capability, including a despooler for PostScript printers and good management features. The security, auditing, and control utilities provide the basics needed by managers of big LANs. People who want to bill for use of LAN resources and want detailed management reports will have to wait for later add-on programs, however.

Anyone with an existing network based on IBM's PC Local Area Network Program or other MS-Net operating systems can

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## IBM OS/2

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gram written by *PC Magazine* contributing editor Charles Petzold (see *Pipeline*, page 40, for details on upcoming OS/2 applications).

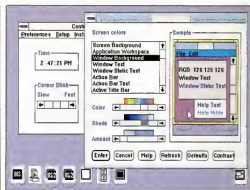
The preconception that's been confirmed most resoundingly by this release is the need for lots of RAM. I tested OS/2 1.1 on two IBM PS/2 Model 60s; one had 3MB RAM, the second had 9MB. The difference was like night and day. The underequipped Model 60 ran OS/2 1.1 like it was running *Microsoft Windows 2.03* without a disk cache—minor delays hampered every operation. The fully packed Model 60 ran like a Mac II—screens snapped to full life almost instantly.

Fast hard disks are no substitute for large RAM chests when running OS/2. There are too many small files needed by the

sessions—two Q&A OS/2 sessions, one OS/2 command line, *The Norton Utilities* running under DOS, and the OS/2 graphics-mode File System. Performance was back to the level of *Microsoft Windows 2.01* in the PM sessions, but the DOS and OS/2 character-mode sessions maintained their fast performance.

OS/2 1.1 fails to solve some of the problems introduced in OS/2 1.0, the character-mode version. Once again, there's no dual-boot option. If you want to run your system as a DOS machine occasionally after you've installed the PM, you'll go through IBM's 16-step procedure for preparing a DOS-booting floppy disk so you can boot from the A: drive.

DOS's corner under OS/2 1.1 is workable but still shows limitations. The basics—like *Lotus 1-2-3*, word processors, and even *Lap-Link*—run, but there are gotchas. For instance,



The Presentation Manager allows you to customize window colors. A small sample window displays your preferences as you choose them.

The File System—a shell you call like any other PM application—is very well designed. Right up front, you'll find a Move command and a Copy command. Better still, you won't need the Copy command if you're looking at the involved directories. Using a mouse, simply click on the file you want to copy and then on the target directory and, voila, the file moves. It's like a Macintosh, but better: your files stay organized because the system won't let you leave a file floating in limbo. It even works with subdirectories.

A new command, Associate, lets you select a data file to be loaded along with an executable. The Options menu lets you decide how your files are displayed (with or without read-only and archive attributes) and how they're sorted. You can have the system display only programs or only data files. Unfortunately, there's no view or type-to-screen command; for that, you'll need to move to an OS/2 command-line session.

Although this File System could replace the DOS command line for most people, you have two ways of running OS/2 from a DOS-like command line.

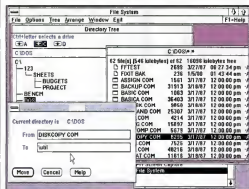
You can run OS/2 from a window—in which case you've got a slow-moving graphics-mode command line—or you can run OS/2 in a fast, full-screen character mode. The character mode display is quick; calling the directory on a Model 60 with 70 file/subdirectory en-

tries took 6 seconds in the graphic window, and a more acceptable 2 seconds in character mode (the same amount of time it took in both DOS mode and when booted under DOS without OS/2). When you run OS/2's command line from a window, however, you can keep other PM activities on-screen.

You move among all running programs by choosing sessions from a windowed program called the Task Manager. Or, you can cycle between active sessions with the Alt-Esc combination. You can operate the Presentation Manager without a mouse, but you'd better have a head for trivia if you do. In some windows, Ctrl-F9 will minimize a menu, in others, Alt-F9 does the trick. Move a window? That's either Ctrl-F7 or Alt-F7. No keyboard template is provided for this arcane system. Stick with a mouse.

OS/2 1.1's best surprise is the System Editor, light-years beyond DOS EDLIN. Any text file can be called in for light editing, and block moves and searches are provided. Major features work from pull-down menus. Lesser features, unfortunately, require tricky key combinations that only a *WordStar* user could love.

The Help system, on the whole, is outstanding. F1 brings relevant aid at any point in a graphic session. In the character-mode sessions, you need to type HELP and a number; this



The Presentation Manager File System provides both Move and Copy commands. You can also copy files by marking the files and their destination with a mouse.

system, too many device drivers and dynamic link libraries needed for even the simplest operations, to be wasting time on constant disk access. Although IBM's minimum requirement for installing OS/2 is 2.5MB (2MB if you don't run the DOS mode), 5MB is about the minimum you'll need for adequate performance, and you'll need more if you plan to run more than three applications at once.

To test speed with a typical number of sessions running, I loaded up the 9MB-equipped Model 60 with five ses-

sions—you can't use extended or expanded memory. *Windows* applications run, but without a mouse. *The Norton Utilities Advanced Edition* could perform most of its miracles, but it couldn't save deleted files. I also succeeded in crashing the entire system from inside the DOS mode: the so-called protected mode didn't protect me from having to cold reboot when a *Lap-Link* transfer was interrupted.

But, problems aside, there are many pleasant surprises here.



system works well, since most error messages are reported with a code number.

It also has an interactive tutorial that will be extremely helpful to anyone who's never used *Windows* or a Macintosh—all others will learn little.

The only thing OS/2 initiates need to know about using Version 1.1 is the distinction between the opening Start Programs menu (your selector for running installed OS/2 programs) and the Task Manager (a monitor on the active sessions that lets you switch sessions). Together, the two take the place of OS/2 1.0's Program Selector screen. It's a setup that I found confusing at first but grew comfortable with by the second day.

Is OS/2 1.1 for you? If you like *Microsoft Windows* or *Macs*, you'll be thrilled with the Presentation Manager. If you like the idea of windowed programs but found *Windows* disappointing, you'll probably come to love the PM. But if you don't have those leanings, there's little here that's likely to change your mind.

Regardless, if you want to be a part of the future that OS/2 1.1 and its Presentation Manager foretell, your course is clear: start stockpiling RAM. [E]

## PC FACT FILE

### IBM OS/2 Standard Edition 1.1

IBM Corp.  
Contact your local authorized IBM dealer.

List Price: \$340; upgrade from OS/2 1.0, free; upgrade from DOS 3.0 or later, \$283.

Requires: IBM PS/2 Models 50, 60, 70, or 80; or PS/2 Model 30 286; or IBM PC AT; or IBM PC-XT Model 286; 2MB RAM and a hard disk.

In Short: The latest version of OS/2, complete with the Presentation Manager, IBM's multitasking graphical windowing interface. Requires massive amounts of RAM. Not copy protected.

CIRCLE 481 ON READER SERVICE CARD

## LAN Manager

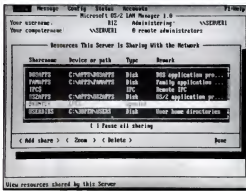
(continued from page 33)

add a 3+Open server without changing the workstations. 3+Open and IBM's PC LAN servers use the same command language and request format.

MS-DOS applications compatible with IBM's PC LAN work fine under 3+Open. However, 3+Open uses a menu structure that conforms to IBM's Systems Application Ar-

or other relatively primitive services involving a lot of detailed programming. 3+Open supports NetBIOS applications, but the LAN Manager family also features a service called Named Pipes that makes it easy to write programs that use only a few programming statements to reliably transmit data across the network.

Named Pipes and similar application program interfaces are abundant in 3+Open and other



The 3+Open single-server view itemizes shared server resources. You can determine the location of a resource and its current users by zooming on that resource.

chitecture. This means that the menus are very graphic and that some people will feel more comfortable using a mouse than a keyboard.

There is full support within 3+Open for both the commonly used XNS network protocols and the DLC protocols IBM uses in its Token-Ring Network architecture. XNS gives 3+Open the ability to operate in networks with bridges and other extension devices supplied by several different companies. DLC ensures that 3+Open can work across IBM's Token-Ring bridges.

### Lan Manager

But the potential of 3+Open and its LAN Manager kit is as big a story as the features of the product available today. The LAN operating system contains a number of built-in services that make it particularly easy for application programs to communicate with each other across the network.

Today's LANs use NetBIOS

LAN Manager implementations. Microsoft and 3Com have also taken steps that make it easier for LAN interface card vendors to provide more-sophisticated drivers, including TCP/IP and ISO interfaces, for a wide variety of cards that will be available to run under this LAN operating system.

These helpful steps both increase the number of network cards available for 3+Open and make it easier to establish links to dissimilar computers through the highly standardized TCP/IP and ISO protocols. Named Pipes and other communications services are available to both OS/2 and DOS stations on the network.

The designers of this software hope to build a large cadre of supporting companies that provide standard and easily used interfaces. In turn, these interfaces should stimulate new applications that bring to life the promises about distributed processing made by so many pundits for so long.

## PC FACT FILE

### 3+Open Lan Manager

3Com Corp.  
3165 Kifer Rd.  
Santa Clara, CA 95052  
(408) 562-6400

List Price: Entry-level system (limited to five users), \$995; advanced system, \$2,995.

Requires: Server: 4MB to 6MB RAM, 80286 or 80386 processor, OS/2 (supplied with both versions of the package). OS/2 workstations: 3MB RAM; DOS workstations: 640K RAM.

In Short: Although it's very RAM-hungry, 3+Open is a strong new LAN operating system with good performance, support for old applications, and openness for new developments. It is a great platform for new distributed applications. Not copy protected.

CIRCLE 447 ON READER SERVICE CARD

### Talking Price

At \$2,995, 3+Open has a price tag that is a few hundred dollars more than Novell's *Advanced NetWare*. An entry-level 3+Open system, limited to five users, carries a more appealing price of \$995.

But to compute the real cost of this LAN operating system, you have to include the price of server RAM. The server requires a minimum of 4MB, but you will probably want at least 6MB to make room for large buffers and a cache. An OS/2 workstation needs about 3MB RAM to be useful. DOS workstations lose nearly 200K to the networking software in a full configuration. 3Com is working to reduce the memory imposition on DOS machines. An option for 386-based DOS workstations puts some of the software in high memory.

If its hunger for RAM doesn't choke it, 3+Open has the features, industry support, and openness to become a very popular LAN operating system. It certainly presents a challenge to the predominance of Novell's *NetWare*—one that Novell will take very seriously. [E]

# Harvard Project Manager 3.0: New Features Target Ease of Use

**PC HANDS ON**

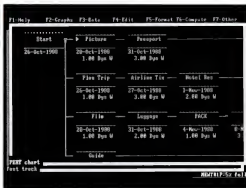
BY JUDY HOUSMAN

*Harvard Project Manager*, Version 3.0, zeros in on the way many people actually plan major projects. And you don't need training in formal project-management techniques to get started.

Renamed from *Harvard Total Project Manager II*, *Harvard Project Manager* 3.0 adds a score of new features. The more enticing of these, such as the Fast Track view and outliner, work toward ease of use. Other notable enhancements include resource-specific calendars and the ability to save report formats.

Time is the horizontal axis in the new Fast Track view. To add a new task, you use the cursor keys to position the cursor below the date on which you want the task to start and then type the name of the task. A task form then prompts you to enter the task's duration. You can place sequential tasks along the same line and overlapping tasks on separate levels.

Lengthening or shortening a task's duration is as easy as pressing a gray Plus or Minus key. Give a single command



Harvard Project Manager 3.0 automatically builds a PERT chart from tasks entered using the Fast Track view.

and you can then use the cursor keys to move a task.

Using this graphic interface, you can give *Harvard Project Manager* the information it needs to fill in planned start dates and earliest and latest starts. You are also just a keystroke away from automatically generating a PERT chart (a network chart that shows the sequence in which tasks are performed). Although you may need to add some of the more complex linkage, *Harvard Project Manager's* PERT chart is uncannily effective.

Like *Harvard Total Project Manager II*, Version 3.0 lets you interactively create a work breakdown structure chart (WBS)—a hierarchical chart that lets you analyze a project into its component parts. The new version also lets you use outlining to analyze the steps involved in a project. In the outline view, you can show a summary of the durations or costs of component tasks next to any composite task.

Version 3.0 also adds one of the most flexible report generators on the market. You control which data appears in a report as well as the way the data is ordered. The new version lets you store and reuse report specifications. You can even tell the program to print a series of such templates, so you can take a coffee break while the reports are printing. Unfortunately, *Harvard Project Manager* still doesn't display reports on-screen.

Version 3.0 and its predecessor are still the only popular project management software packages that can produce reports with details from more than one independent project. To produce a multiple-project report with competitors such as *Time Line*, *Microsoft Project*,

**PC FACT FILE**

**Harvard Project Manager, Version 3.0**  
Software Publishing Corp.  
1901 Landing Dr.  
P.O. Box 7210  
Mountain View, CA 94039  
(415) 962-8910  
List Price: \$695. Upgrade from *Harvard Total Project Manager II*, \$95 until January 1, \$135 thereafter; upgrade free if *HTPM II* purchased after August 16.  
Requires: 512K RAM for single user, 640K RAM for network; hard disk; DOS 2.0 or later.

**In Short:** The latest upgrade to this full-featured project manager adds resource-specific calendars, report templates, outlining, and an innovative interface for people new to project management techniques. Not copy protected.

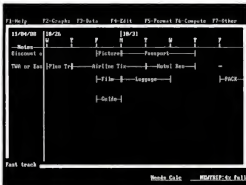
CIRCLE 447 ON READER SERVICE CARD

or *SuperProject Plus*, you must first go through the awkward process of incorporating all the relevant projects into one dummy master project.

*Harvard Project Manager* now also lets you set up different calendars of workdays for each resource.

All the new features come at a price. Version 3.0 requires a fast machine with a fast hard disk: it is just too irritatingly slow otherwise. While the Fast Track is one of the most intuitive interfaces we've seen for beginning a project plan, the product as a whole doesn't have the simplicity and coherence of *Time Line*. And the manual really ought to include a new features section.

All in all, these latest additions to Software Publishing's popular project manager make it not only more powerful but also easier to use. *Harvard Project Manager* 3.0 should appeal especially to people who manage multiple projects and people who manage projects but have no formal project management training.



To enter a new task into the Fast Track view, you place the cursor below the correct date and type the name of the task.

"...as a user of WordPerfect 5.0 and a Hewlett-Packard LaserJet II, I would never go back to either the Bitstream or Hewlett-Packard soft fonts."



Sincerely,

*Daniel W. Fessler*

Daniel W. Fessler  
Professor of Law

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1.1, Wordstar 2000 (3.0), Wordstar Professional 5.0, PC Write, PFS First Publisher 2.0, Lotus Manuscript 2.0 and more. And each font comes in 6 to 60 pt., portrait and landscape; italic, bold and bold italic.

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P.O. Box 299 Rockland, DE 19732				

\*Glyphix lets you print up to 30 point type on a LaserJet Plus and up to 60 pt. on a Series II without additional memory. Glyphix fonts require an IBM PC, AT, XT, PS/2 or compatible with 64K RAM; a hard drive, LaserJet Plus, Series II or compatible printer, MS-DOS 2.0 or later. Glyphix Font Managers are available for Microsoft Word and Word Perfect 4.1, 4.2 & 5.0. Glyphix fonts work with most popular word processing software, Ventura Publisher and Aldus Pagemaker.

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# PC-Kwik Power Pack Integrates Disk Cache, Print Spooler, RAMdisk

PC HANDS ON

BY BARRY SIMON

It is often difficult to decide how to divide any RAM you can spare among a disk cache, print spooler, and RAMdisk. PC-Kwik Power Pack, Version 1.1, from Multisoft, makes the choice easy. The package includes Version 3.12 of Multisoft's highly regarded \$79.95 disk cache—*Super PC-Kwik*—a print spooler and a RAMdisk with speedup programs for screen and keyboard.

The RAMdisk, spooler, and screen-recall buffer will work only if the cache is loaded and borrow memory from the cache as needed. This means you won't waste memory on the spooler or RAMdisk when they're not in use. For example, you might set up a 3MB cache, 2MB RAMdisk, and 1MB spooler but use only a total of 3MB—the amount of RAM defined for the cache. When you print, the spooler would borrow up to 1MB from the cache. Similarly, the RAMdisk would borrow up to 2MB from the cache.

The only downside to this equation is that when you erase a file from the RAMdisk, the memory is returned to the cache, and all of Norton's horses and all of Mace's men won't put the file back together again.

Each of the three main programs lets you use conventional memory or up to 16MB of expanded or extended memory. The extended memory scheme

is compatible with Microsoft's new XMS standard used by *Microsoft Windows 2.10* and also with Vdisk. With expanded memory, the control programs can take as little as 16K of conventional memory, although 30K is more typical if you enable some of the extra features.

The cache has full track read, a proprietary disk write speedup, and special support for diskettes. The spooler has an

```
Super PC-Kwik Disk Accelerator, Version 3.12, 5/8 1989
Copyright 1988, 1989 Multisoft Corporation. All Rights Reserved.
Program licensed exclusively for use on a single computer.
Super PC-Kwik program was previously installed.
Subset of program (SUPERPC3.12) loaded.
Following is a list of the parameters (if any):
/0 Advanced support of diskette transfers.
/1 Advanced support of hard disk transfers.
/2 Perform hotchk copies to/from cache.
/3 Optional superblock for advanced support.
/4 Switches return BIOS errors.
/5 Track buffering using a 17 sector buffer.
/6 Use volume change hardware.
/7 Check write requests for redundancy.
/8 BIOS driver will not be loaded.
/9 256K expanded memory cache has been set up as follows:
Conventional 16384
RAM/Resident 16384
PC-Bank 512K
Available 770
Total 1294K
```


The PC-Kwik Power Pack displays a full list of command switches along with a tally of your system's memory and how it is allocated.

PC FACT FILE

**PC-Kwik Power Pack, Version 1.1**  
Multisoft Corp.  
15100 SW Koll Pkwy., Suite L  
Beaverton, OR 97006  
(503) 644-5644  
(800) 288-5945  
List Price: \$129.95 (includes Super PC-Kwik, Version 3.12); upgrade to PC-Kwik Power Pack from Super PC-Kwik 2.x, \$49.95. (Super PC-Kwik 3.12, \$79.95; upgrade to Super PC-Kwik 3.12 from Super PC-Kwik 2.x, \$19.95.)  
Requires: 256K RAM, EMS or extended memory recommended, DOS 2.0 or later.

CIRCLE 435 ON READER SERVICE CARD

optional control program that warns you when your printer is out of paper and allows you to flush the spooler or send escape sequences to the printer.

PC-Kwik Power Pack gives you an efficient way to use precious RAM to speed up your computer's input/output. The coordination between the cache, print spooler, and RAMdisk makes the package well worth its \$129.95 price tag. 

## \$75 Inside! Analyzes Program Speed

PC HANDS ON

BY ETHAN WINER

No matter what computer language a programmer uses, one of the most important goals is to create a program that runs as quickly as possible. Unfortunately, there is no simple way to determine how long a particular sequence of instructions will take to execute. Indeed, much of the art of programming is knowing which solution will be the most efficient for a given problem.

*Inside!*, by Paradigm Systems, lets programmers test their code to determine how quickly the various portions of their programs are running.

Armed with this information, a programmer can then decide which portions should be rewritten or perhaps even translated into assembly language.

*Inside!* allows the programmer to determine how much time is spent within each procedure in a program, while providing a count of the number of times each is called. Minimum, maximum, and average times, accurate to within 1 microsecond, are reported for each sub-program or function. The percentage of time taken by each procedure is also displayed as part of the output report.

Another valuable *Inside!* option separates the amount of time taken by calls to DOS from the rest of a program's activity.

For example, if a routine that uses a DOS service takes 25 milliseconds to execute, but the DOS call itself takes 24 milliseconds, there would be little point in trying to improve the routine.

I tested the QuickBASIC 4.0 version of *Inside!*, which requires a program to be compiled and linked for Microsoft's CodeView debugger using the /Zi and /Co switches. *Inside!* uses the CodeView information to locate the start and end of each procedure. However, CodeView itself is not required.


The attractive and thorough manual for *Inside!* covers all aspects of the program's operation. Numerous examples are provided, along with a brief tu-

PC FACT FILE

**Inside!**  
Paradigm Systems Inc.  
P.O. Box 152  
Milford, MA 01757  
(508) 478-0499  
List Price: \$75  
Requires: 256K RAM, a high-level language, DOS 2.0 or later. Not copy protected.

CIRCLE 436 ON READER SERVICE CARD

torial that discusses many of the concepts involved in execution profiling.

*Inside!* is available in separate versions for a number of popular C and Pascal compilers, as well as for QuickBASIC 4.0, FORTRAN, and Modula-2. 

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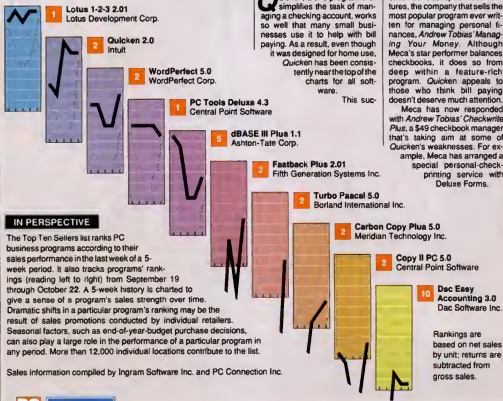
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# PIPELINE

## TOP TEN SELLERS — A 5-Week History



**Q**uicken, a \$49 program that simplifies the task of managing a checking account, works so well that many small businesses use it to help with bill paying. As a result, even though it was designed for home use,

Quicken has been consistently near the top of the charts for all software.

This suc-

cess hasn't escaped Meca Ventures, the company that sells the most popular program ever written for managing personal finances, *Andrew Tobias' Managing Your Money*. Although Meca's star performer balances checkbooks, it does so from deep within a feature-rich program. Quicken appeals to those who think bill paying doesn't deserve much attention.

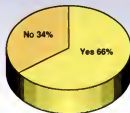
Meca has now responded with *Andrew Tobias' Checkwrite Plus*, a \$49 checkbook manager that's taking aim at some of Quicken's weaknesses. For example, Meca has arranged a special personal-check-printing service with Deluxe Forms.

## PC SURVEY

The last time we looked at desktop publishing among *PC Magazine* readers (Pipeline, August 1988), only 59 percent said they used or had selected a desktop publishing program for their company. In our most recent poll, we found a 7 percent increase.

This poll also found a gain in the share of people who use Software Publishing's *PFS:First Publisher*. *WordPerfect 5.0* had not yet been released when the first poll was taken, but 6 months after shipment the word processor has already made significant inroads into desktop publishing programs.

**Do you use or have you selected for your company a desktop publishing program?**



## OS/2 AND PM SIGNPOSTS

Shipment of the first copies of OS/2 1.1 with the Presentation Manager weren't the only recent signs of life for IBM and Microsoft's multitasking operating system (see page 33).

Symantec, which is developing a reputation for staying at the front of trends, shipped *Q&A OS/2* in October. Happily, the upgrade is free for any registered user of *Q&A 3.0*. All they need to do is mail the DOS-version disks to Symantec in Cupertino, California; a set of either 3 1/2- or 5 1/4-inch disks will be sent back, without so much as a handling charge.

The Software Group has just begun shipping an OS/2 version of *Enable*.

And Microsoft will finally show some support for its own operating system in December when the company ships *Microsoft Word 5.0* with both DOS and OS/2 versions in the same package.

Lotus is still sticking to its plan to ship both OS/2 and DOS versions of *Lotus 1-2-3*, Release 3, in the same box—whenever Release 3 makes it out the door.

Although satisfying the customer is a consideration for publishers confronting the multiple-version question, the factor most likely to make two-disks-in-one-

box common is the size of retailer's shelves. Store owners don't want yet another fat software box to stock if they can help it, and software publishers don't like to displease software retailers. Looks like the consumer will get lucky this time.

**Easing the OS/2 Transition**  
Users who want to move from DOS to OS/2 simply have to be sure they have the heavy-duty hardware and the desire. Software programmers are looking at long hours of reworking code.

But if the program to be ported is a *Microsoft Windows* application, a new product from Micrografx may cut the programming time dramatically. A software tool kit from Micrografx will translate *Windows* function calls to the OS/2 Presentation Manager function calls, saving a large measure of the time needed to port a *Windows* application to the Presentation Manager. The programmer then relinks the original source code, including Micrografx's emulation libraries with the program's external libraries.

Of course, it's not a complete solution, since many

*Windows* applications have DOS calls (including disk access) that Micrografx's tool kit can't fix; Micrografx estimates the tool kit can save up to 80 percent of the conversion time.

Large publishers, like Aldus,

**Prices have yet to tumble, but slight improvements can be seen in the tight market for RAM.**

have already invested the effort to rewrite their *Windows* applications for the Presentation Manager (*PageMaker* for OS/2 is nearly ready for shipment and a Presentation Manager version of *SideKick* that's very much like *SideKick* for the Macintosh will be ready next spring), but the Micrografx tool kit will give small publishers with limited resources a boost.

Microsoft says that more than 5,000 copies of the OS/2 Programmer's Toolkit were shipped (anyone interested in writing a commercial program for OS/2 needed the kit, and its regular upgrades, to learn about the new operating system over

the last year). Even with all these programmers at work, no applications were ready to run under the Presentation Manager when it shipped on October 31.

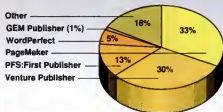
**Modest Gains in RAM Supply**  
Prices have yet to tumble, but slight improvements can be seen in the tight market for RAM. Most manufacturers report that they can buy what they need, although they're still holding back on increasing the RAM configurations in their base models until costs come down.

Recently, IBM canceled orders for RAM that it had placed with Japanese chip makers. IBM has been quietly increasing its internal production of RAM to help make it immune to market fluctuations.

Earlier this fall, Micron Technology of Boise, Idaho, the last American company to sell RAM other than Texas Instruments, raised \$75 million for expansion of its capacity. It remains to be seen if Micron's growth will help American buyers since the money came from Amstrad, the leading British PC maker, but every increase in RAM production helps free chips that are needed for new hardware.

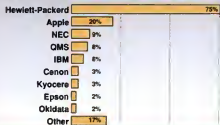
—Gus Venditto

### Which desktop publishing package did you select?



### Which brand of laser printer does your company own?

(More than one answer per category was possible)





RESTAURANT

Sales Prospects

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Last Call Date \_\_\_\_\_

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into Q&A and put  
it on the local  
area network.  
Thanks—Tom

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\*Q&A 3.0 single user \$349 (supports full record locking of databases shared on a LAN). Optional Q&A Network Pack (\$250 when added to Q&A 3.0 on a LAN) allows three additional users to simultaneously operate Q&A. Add additional Q&A Network Packs for more simultaneous users. Q&A, Software Digest's #1 file manager \$65.95. InfoWorld's highest rating ever given (3.5/4.0). PC Magazine Editor's Choice #1/88. © 1988 Symantec, 20000 Town Avenue, Cupertino, CA 95014 (408) 253-9600.

CIRCLE 250 ON READER SERVICE CARD

PC  
Magazine

Editor's Choice



# All ChargeCard Lets 286 Machines Run 386 Programs, Boosts Usable DOS RAM to 960K

## PC HANDS ON

BY WINN L. ROSCH

DOS, the AT system design, and the 80286 processor itself all conspire to limit the useful memory in an AT to 640K. With the \$399 All ChargeCard, you can change that by giving your lowly 80286 the memory handling abilities of the 80386.

Install the ChargeCard software and the small (2- by 2½-inch) circuit board, and the true multitasking programs (*PC/MOS 386*, *Multilink Advanced*, and *DESQview*) will run on your 80286. Or you can convert extended memory into fast LIM 4.0 memory, run terminate-and-stay-resident programs outside the 640K DOS memory area, or give DOS almost a full megabyte of contiguous memory for running your favorite applications.

The ChargeCard helps your AT, PS/2 Model 50, Model 60, or compatible work like a 386 machine by mapping memory from one logical address to another, shuffling and dealing with RAM in 4K pages as adroitly as a three-card monte artist. Of course, the ChargeCard can't turn your 80286 into an 80386. The 80286 will never be able to handle 32-bit instructions.

In its present form, the ChargeCard requires separate software drivers for each of its several operating modes. *PC/MOS/386*, *Multilink*, *DESQview*, and LIM 4.0 abilities are handled in a straightforward manner by individual drivers. Extending DOS and remapping TSR programs also requires

drivers. While a future software release will combine all the drivers for native ChargeCard functions into a single program, the drivers for *PC/MOS/386* and *Multilink* will remain separate, since these were actually written by the publishers of the environments.

Each of the modes of the ChargeCard has its own features and idiosyncrasies. For instance, when you want to ex-

range, leaving about 960K of contiguous memory for DOS applications. Unaided, most programs cannot cope with this dirty trick, so the package includes patches for about 85 common applications, from *Lotus 1-2-3* to *WordPerfect*. In addition, any "TopView-aware" application (that is, a program that checks the BIOS to see where video memory really is located) will also work with this ChargeCard mode.

Installation of the ChargeCard hardware is remarkably easy, assuming you're courageous enough to pull out your 80286 chip. Just pop the ChargeCard in its stead, slip the 80286 into a socket on the ChargeCard, and you're done. The company has conveniently supplied the only

company is aware of the problem, which is caused by the test's resetting an interrupt used by the ChargeCard. A few commercial applications behave similarly, but All Computers is developing a fix that should be incorporated in the new software release.

The ChargeCard works as advertised and just may be one of the best products available to wring the last bit of RAM from your 80286. However, it remains an understandably complex product.

The hardware installation and program patching may be more than casual users will want to deal with. Moreover, the price of the ChargeCard and an adapter cable for a compatible computer is high enough to make an 80386-based replacement motherboard—which will add performance as well as features—another alternative worth considering.



tool you'll need. Special adapter cables and sockets are available from All Computers for \$100 each for handling the 80286 chip packages that differ from the PGA (Pin Grid Array) used in IBM computers.

In the PS/2 Model 60 we used for review, the ChargeCard itself was low enough not to interfere with expansion slots, but once the 80286 chip was installed in it, the assembly became tall enough to impinge on one slot.

The ChargeCard imposed no overt problems during the evaluation. It did not harm system performance in any way, either in instruction execution or memory access speed. The only incompatibility observed (other than the restrictions noted above in using some of its modes) was a consistent crash when exiting the PC Labs benchmark tests after testing memory speed. The

## PC FACT FILE

All ChargeCard Inc.  
21 St. Clair Ave. East, #203  
Toronto, Ontario M4T 1L9  
Canada

(416) 960-0111

List Price: \$399; processor socket adapter for non-IBM machines, \$100.

**Requires:** 80286-based computer; not compatible with AT&T 6300 Plus, Sanyo computers, or those based on the IndTech system board.

**In Short:** A hardware memory-management add-on for 80286-based computers that makes more memory useful, gives full hardware compatibility with the LIM 4.0 standard using standard extended memory, and stretches RAM available to DOS.

CIRCLE 437 ON READER SERVICE CARD

ecute a TSR program in non-DOS memory, you must run a special loader program in addition to the appropriate driver. Whatever TSR programs you want to work above the 640K DOS must still fit within the confines of real-mode memory, squeezed into the cracks around the video and BIOS areas. Unlike when using an 80386-based computer and a program like *386-to-the-Max*, however, the DOS area and this add-on memory do not appear contiguous to the loader. If all of a TSR cannot be shoehorned above the 640K limit, the ChargeCard simply won't load it there.

The megabyte-of-DOS-memory mode works by moving BIOS routines to the protected mode memory range and remapping video memory to the high end of the real addressing



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# Fax Worldwide via MCI Mail

## PC HANDS ON

BY STEPHEN MANES

Need to send a fax from the Mid-Northern Motel at half past midnight? Need to post a hundred identical faxes in 10 minutes? You may be in luck. MCI

Mail recently unveiled its new Fax Dispatch Service, adding the 4-million-plus Group 3 fax machines worldwide to MCI's myriad of electronic and paper message destinations.

The service automatically generates a cover page with the date and time the message was

composed, the name of the MCI mailbox that sent it, the addressee, the subject, and the number of pages to follow. The message itself appears in a 10-pitch fixed-width font with up to 80 characters per line and 56 lines per page.

The cover sheet always travels free. Otherwise, U.S. delivery costs 60 cents for the first half page and 40 cents for each additional half page—slightly more to Alaska and Hawaii. Prices vary greatly for overseas delivery; a full schedule is available on-line by typing HELP FAX PRICING.

There's no need to request a receipt—and no charge for one. Each successful transmission puts a receipt complete with page count and time of delivery in the sender's MCI Inbox.

MCI Mail retries a busy fax machine for 4 hours by default, but the sender can specify a retry period from half an hour to 12 hours. A failure—bad number, voice phone, whatever—will generate a cancellation notice with a description of the problem; it's the sender's job to solve it and retransmit.

Addressing a message for

## PC FACT FILE

**MCI Mail Fax Dispatch**  
1150 17th St., #800  
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D.C. and abroad: (202) 833-8484  
MCI Mail number: 267-1163  
List Price: Varies  
Requires: MCI Mail service

CIRCLE 439 ON READER SERVICE CARD

## How to Use MCI's Fax Dispatch Service

You address a message for delivery via MCI Mail Fax Dispatch from any TO: or CC: prompt. The trick is to follow the addressee's name with the letters EMS (short for Electronic Mail System) in parentheses.

Press Enter, and you'll see the prompt EMS:. Respond by typing FAX and pressing Enter; you'll see confirmation that you've reached the fax service, followed by the "mailbox" prompt MBX:.

Type PHONE, a colon, a space, and the number of the recipient's fax machine, making sure to include only digits, hyphens, and spaces. An area code is mandatory; for delivery to most foreign countries, a local

number must also be prefaced by 011 and a country code.

Press Enter, and another MBX: prompt will appear. To accept MCI Mail's default retry time of 4 hours, just press Enter. To change the default, type RETRY, a colon, a space, and a specific number of hours from .5 to 12.

Next, the system will display what you've entered and request confirmation. Once you accept, you can enter additional addresses—electronic, paper, fax, whatever—as usual.

If you use Lotus Express, choose F10, Compose—then F9, REMS. After that, simply follow the on-line model.

—Stephen Manes

fax delivery is somewhat tricky (see the sidebar "How to Use MCI's Fax Dispatch Service"), but detailed information is available on-line by typing HELP FAX. MCI Mail intends to simplify addressing and offer fax versions of its customized paper mail letterheads and signatures during 1989.

The MCI Mail Fax Dispatch service won't supplant a fax machine; so far, it can't transmit anything but low-order ASCII characters (except for an MCI Mail logo on the cover page), nor can it receive inbound faxes of any kind. But when you're faxless or want to send lots of faxes at one go, it can be a lifesaver.

# Kurzweil OCR Understands Columns

## PC HANDS ON

BY GUS VENDITTO

Kurzweil, which has almost single-handedly raised OCRs from fantasy to practicality, has added column recognition to a reasonably priced scanner.

The Kurzweil Discover 7320 Model 30 can handle up to four columns, ending the need for cutting documents into strips before feeding them into the scanner. This capability comes on top of the 7320 series' ability to read typeset text of between 8 and 24 points with virtually no help from users.

It's not yet perfect; even when reading the 10-point type on a page in PC Magazine's Productivity section, there were

a significant number of errors. Most of the errors were a result of the technical language in these pieces (Kurzweil's recognition algorithms compare input characters with a lexicon), but italics confused the system. You can expand the lexicon with your own terms, but you're out of luck if you want to read in lots of program code, since unique filenames and variables will always be confused by the Model 30's logic.

The Model 30's work well with PC Magazine's Power Programming department, which has a straightforward, three-column layout with titles that extend beyond the columns.

The Model 30 also works as a graphic scanner, saving

graphics as either TIFF or .PCX files, but it ignores text when operating as a graphic scanner.

The column recognition system divides the page into zones; when columns of type are lined up next to each other on the page, Kurzweil will flow that text into a single stream, inserting hard carriage returns where the column line ends.

Unfortunately, as Kurzweil's recognition software is blazing into the future, its interface remains stuck in the primitive days of computing. For instance, it takes a while to learn that when the screen reads "Scanner not ready," it means your document has been successfully scanned.

With all its flaws and its hefty \$13,950 price tag, however,

## PC FACT FILE

**Kurzweil Discover 7320 Model 30**  
Kurzweil Computer Products  
185 Albany St.  
Cambridge, MA 02139  
(617) 864-4700  
List Price: \$13,950; upgrade from Model 10, \$7,100; upgrade from Model 20, \$4,100; automatic document feeder, \$595.  
Requires: 640K RAM, hard disk, DOS 2.0 or later.

CIRCLE 434 ON READER SERVICE CARD

the Kurzweil Discover 7320 Model 30 is still a bargain. Kurzweil also wins points for making the upgrade available to owners of earlier models.

Quicken is easy because it looks like your paper checkbook. There's nothing new to learn.

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Quicken is as easy as the pen and paper you use now. You'll see the familiar checkbook and check register right on your screen. The only thing that changes is how fast you finish your financial chores. This is bookkeeping that's totally hassle-free.

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Here's why Quicken is the world's most popular:

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—Steven Morgenstern, Home Office Computing

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## Pinstripe: Business Graphics for \$200

### PC HANDS ON

BY JENNIFER ZAINO

The typical MS-DOS user looking for a graphics presentation package might be in for a surprise if he chooses Spinnaker Software's *Pinstripe Presenter*. The \$199.95 program will take him into a world where graphics files are stored in "folders," which in turn are kept in "cabinets." It is a world where you can delete a file by (gasp!) clicking on an image of a trash can.

The Apple-like interface is certainly not the easiest thing to become accustomed to, and that difficulty could be detrimental to a package directed at the beginning and occasional graphics user.

Luckily, the software has other features more likely to woo the graphics amateur. It offers 20 preformatted styles that can be applied to word, bar, stacked bar, line, area, tab, and pie charts. These styles automatically set the chart's background color, layout of titles and subtitles, and margins.

Options within the chart-editing modules (available through pop-up point-and-shoot menus) let you change background color or the color of any

part of a chart, create 3-D images and drop shadows, or explode pieces of a pie.

You can also modify text size, spacing, justification, and fonts. (Be aware that the package directly supports only Swiss Bold and Swiss regular fonts; your output device determines the others you can access.) You can use the keyboard to make these changes, but a mouse works better.

You'll enjoy the ease with which you can switch from one graph type to another. Be cau-

tious when changing other graphs into free-form drawings; while the switch lets you add additional text and objects, you lose your numerical data in the process. The only way to avoid this is to make a copy.

*Pinstripe Presenter* offers features that some of the competition lack, such as an on-screen slide-show facility, a fairly substantial symbol library, and support for slide output via the Polaroid Palette image recorder or the MAGIcorp service bureau. (It will also output to the HP La-



*Pinstripe Presenter allows you to link multiple graphs together. However, you cannot save or edit the graphs as a single file.*

### PC FACT FILE

#### *Pinstripe Presenter*

Spinnaker Software  
One Kendall Square  
Cambridge, MA 02139  
(617) 494-1200  
List Price: \$199.95

Requires: 512K RAM; CGA, EGA, VGA, MCGA, or Hercules adapter card (mouse optional); DOS 2.0 or later. Not copy protected.

CIRCLE 436 ON READER SERVICE CARD

serjet Series II, HP PaintJet, PostScript, Epson, and IBM graphics printers.)

However, the package imports only *Lotus 1-2-3* and *Symphony* files, and only those files in which a graph has been stored with the worksheet. Even this option is limited by the fact that the program cannot work with any number over 5,000.

And while it is notable that you can link multiple files together and create combination charts, you cannot actually save them as a single file. The program also lacks basic features, such as plotter support.

The end result of your work? High-quality output. Now all Spinnaker has to do is make that output easier to achieve.

## \$99 Cure for Accidental Data Loss

### PC HANDS ON

BY LORI GRUNIN

Suppose you accidentally exit a program without saving. This is no problem for Daybreak Technologies' *Cocoon*, a keystroke-logging utility that lets users rebuild unsaved portions of word processing documents, spreadsheets, and databases.

With *Cocoon*, resurrecting the file can be as simple as typing RECOVERY. *Cocoon* summons the application and its log file, listing the keystrokes along the bottom of the screen. For instance, if you load a spreadsheet by pointing to a filename, the

keystrokes would appear as /f(r[RIGHT][RIGHT][CR]. After prompting for automatic or manual recovery, *Cocoon* executes the keystrokes.

Here lie two traps. You can end up modifying the wrong file if the list has changed. And, although the manual states that *Cocoon* ignores input from TSRs and hot-linked programs, many times the keystrokes appear in the log file amid those of the main application.

*Cocoon* provides two solutions to these problems. The first is converting the log file to ASCII and editing it with a word processor. This can get confusing, since the ASCII file is a

block of direction keys and function-key representations interspersed with your text.

The second technique is running RECOVERY in manual mode, deleting unwanted keystrokes as it executes. But if one undesired keystroke slips through, you may have to terminate the recovery, delete the finished section from the log file, and rerun the recovery.

SETDEBUG, another feature, is a by-product of the keystroke-logging capability. It aids developers of memory-resident programs by feeding input from a file while running a code-debugging program.

*Cocoon* can sometimes

### PC FACT FILE

#### *Cocoon*, Version 1.0

Daybreak Technologies Inc.  
21311 Hawthorne Blvd., #300  
Torrance, CA 90503  
(213) 542-5888

List Price: \$99  
Requires: 20K free RAM, hard disk, DOS 2.0 or later. Not copy protected.

CIRCLE 438 ON READER SERVICE CARD

make recovery more complex than it is worth. But for simple and mouseless text or data entry, it can mean the difference between here today and gone tomorrow.





## Don't drag your PC along! Take the shortcut between programs and files with Software Carousel®

Why get dragged down by that old PC technology?

Despite the sophistication of today's PCs, there's one thing they still don't do. And that's work the way people work. Jumping from one task to another—from budgets to memos to phone calls and back.

So every time you need to change programs—or just look at another file—it's the same old, tiresome routine—saving, exiting, loading, retrieving. Not very convenient. Not very human. Now you could wait for the "next generation" of computers. Or use Software Carousel, and get the speed and convenience you need today, with the software, and computer, you already own. Here's how to make Software Carousel work for you.

Software Carousel is the amazingly easy way to switch almost instantly from WordPerfect to 1-2-3 to dBASE to DOS to whatever else you want. Or go from one file to another in the same program. All without saving or retrieving—or wasting a precious moment of your time. Or your computer's memory.

It works by creating a number of independent software slots to load your programs into. You get up to ten of these software slots, so you can load up to ten programs.

Need to crunch numbers? Hit a key and there's your spreadsheet. Need your word processor? Don't bother saving your spreadsheet file. Just whip over to your document and do your work. Snap back to your spreadsheet and it's just like you left it. It's like all your programs are "pop-ups," just a hockey away.

Or load the same program into a few different slots, each with a different file. Now go from one to another in an instant.

**Here's the best part of all.**

You may have heard about some other "environment" programs that claim to do something similar to Software Carousel. But there are several important differences.

First, they make you split your memory up among the programs you want to use. Software Carousel lets you use all available memory in each and every program. It even supports expanded and extended memory.

Other environment programs work with only some software. Software Carousel

works with everything. Period. It even resolves conflicts among memory resident programs.

Other software creates a working environment that's complex, unfamiliar, with cramped little windows and strange commands. Software Carousel takes minutes to set-up just the way you want it. All your software looks and acts exactly as it always did. It's so downright useful, even IBM® recommends it.

Even as you read this page, there are tens of thousands of Software Carousel users zipping through their work without laborious and repetitive commands. And without the usual 640K limit imposed by DOS. In fact, even IBM recommends Software Carousel for use with their most popular mainframe-to-PC communications package.

We think you'll agree, that with this kind of speed, convenience, and next-generation performance, \$79.95 is a small price to pay.

Look for Software Carousel at software dealers everywhere. Or order direct from SoftLogic Solutions by calling us toll-free. If, after thirty days, you're not satisfied that Software Carousel is the right way to get that old PC technology off your back, we'll gladly arrange for a refund of your purchase price.

### Here's what people are saying about Software Carousel:

"Can't believe how well it works. Who needs 80386!"  
—Ralph Evans, Attorney, Fullerton, CA

"Unlike other attempts (e.g. MS Windows, DesqView) yours works, is not fragile and does not intrude its 'personality' on everything that we do."  
—Colin Ralph, Ralph & Panzer, Inc., Seattle, WA

"Fantastic program. Great book. Saves me an hour a day! Thanks."  
—Larry Pearsall, Rolling Hills Covenant Church, Rolling Hills Estates, CA

"Solved all my problems with resident software."  
—Walter Agnew, West Islip, NY

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- 101 Enhanced Keyboard
- Western Digital Dual Floppy and Dual Hard Disk Controller
- 1.2MB Floppy Disk Drive
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- Socket for an 80387
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- Tower Case Available (add \$225.00)
- One 32 Bit, Five 16 Bit and Two 8 Bit Slots
- Landmark speed test equals 33.6, Norton SI rating equals 31.6
- Large selection of Hard Disks available from 20 to 320MB in ESDI, SCSI, RLL and MFM drive configurations.

**20MHz \$2,295 386-9**

Up to 16MB of 32 Bit RAM. Sockets for Weitek, 80387 and 80287 on board.

- 80386 Running at 16/20MHz and 0 Wait State
- 1MB of 32 Bit 0 Wait State Ram
- Speed selectable for 16/20MHz
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- Norton SI rating equals 27

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- AT and OS/2 Compatibility
- 220 Watt Power Supply
- Socket for 80287 Coprocessor

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Accepts Compaq memory boards

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- Speed selectable for 4.77/9.5/16MHz
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- Western Digital 2F-2H Controller
- 1.2MB Floppy Disk Drive
- AT and OS/2 Compatibility
- 220 Watt Power Supply
- Socket for 80287 (daughter card for 80387)
- One 32 Bit Slot, Five 16 Bit Slots, Two 8 Bit Slots
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## NEW ON THE MARKET

by Lon Grunin

**Wyse's Networker Has Power But No Disks**

Wyse Technology has responded to the growth in LAN installations with the \$1,999 diskless WY-212m Network Terminal. The Wyse WY-212m is a one-piece unit housing a 12.5-MHz 80286 processor and 1MB RAM. The flat, 14-inch display is monochrome VGA compatible at both the BIOS and register levels.

Wyse says that the WY-212m supports Novell's NetWare and 3Com's 3+Share

on Ethernet and IBM Token-Ring LANs. Wyse accommodates other LAN standards via a 16-bit, industry-standard slot.

The small-footprint (11- by 11½-inch) terminal has two RS-232 serial connector ports and a parallel printer port. In the belief that computers should be seen and not heard, Wyse thoughtfully designed the WY-212m without a cooling fan.

**List Price:** Wyse WY-212m Network Terminal, \$1,999. Wyse Technology, 3571 N. First St., San Jose, CA 95134; (408) 433-1000.

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The Wyse WY-212m Network Terminal offers 12-MHz 80286 in a diskless workstation.

**U.S. Robotics' Family Of Modems Still Growing**

To provide increased flexibility for high-speed modem users, U.S. Robotics has added two more members to its family of modems. The \$1,595 Courier HST Dual Standard gives users a choice between the company's proprietary HST asynchronous full-duplex transmission and CCITT V.32 standard compatibility.

In HST mode, the modem transmits data asynchronously at 9,600/7,200/4,800 bits per second; in V.32 mode it sends and receives either synchronous or asynchronous data at the same rates.

The Dual Standard provides

MNP Classes 1 through 4 error-control protocols. It also uses MNP Class 5 data compression, which U.S. Robotics says increases transfer rates by up to 80 percent when the unit is joined to another Class 5 modem.

The 9,600-bps Courier V.32 is priced at \$1,495 and features a fallback to 7,200 bps instead of the 4,800 bps required by the V.32 specifications.

Both modems use the "AT" command set, and can store a small directory of phone numbers in nonvolatile RAM.

**List Price:** Courier HST Dual Standard, \$1,595; Courier V.32, \$1,495. U.S. Robotics Inc., 8100 N. McCormick Blvd., Skokie, IL 60076; (312) 982-5010.

CIRCLE 446 ON READER SERVICE CARD

**LiveWire Lets You Tap Financial News Network**

Stock market investors who need up-to-the-minute quotations but don't want to pay high subscription fees can now plug into Financial News Network with LiveWire from CableSoft for a one-time price of \$995.

A television receiver on LiveWire's board connects with a cable TV outlet. FNN's ticker-tape signals are digitized and converted into ASCII for analysis with LiveWire's software. The data can then be translated into DIF or ASCII format.

Transactions can be displayed continuously or moni-

tored in the background while running another application. Five alarms can be programmed for each security—buy, sell, stop buy, stop sell, and volume.

LiveWire provides portfolio management, rate-of-return tracking, and cash accounting. You'll also find tools to graph simple, weighted, and exponential moving averages; channels; and trend lines.

**List Price:** LiveWire, \$995.

**Requires:** 512K RAM, hard disk, CGA card, Financial News Network reception, DOS 2.1 or later. CableSoft Inc., 307 W. Burlington Ave., Fairfield, IA 52556; (515) 472-8393.

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HOT PROSPECT

**80286-based Portable Computer With Cellular Modem and Phone**

Since there never seems to be a phone jack around when you need one, Intelligence Technology developed a new portable computer with a cellular modem and phone.

Inside the \$7,195 ITC-286CAT is a 1,200 bit-per-second Hayes-compatible cellular modem with auto-dial and auto-answer capability, and an error-correcting protocol. There is also an RJ11 jack for a land line connection.

The internal AMPS-compatible 3-watt cellular phone has a built-in speaker phone and a retractable antenna. Jacks on the side of the machine accommodate the external handset or headset.

Other features of this 12-MHz 80286-based machine include 640K of static RAM (expandable to 2.6MB), a 10½-

inch EGA-compatible supertwist blue-mode LCD, and one 16-bit AT expansion slot. A 1.44MB floppy disk and a 40MB hard disk drive are standard. ITC estimates that the rechargeable lead acid batteries will run for 3 hours.

**List Price:** ITC-286CAT, \$7,195. Intelligence Technology Corp., P.O. Box 671125, Dallas, TX 75367; (214) 250-4277.

CIRCLE 440 ON READER SERVICE CARD



A cellular modem and phone in the portable ITC-286CAT means you're never far from your data.

## NEW ON THE MARKET

**\$4,995 Kurzweil Scanner Provides Intelligent Character Recognition**

Xerox Imaging Systems has introduced three new scanners with something for everyone. At the top of the line are two scanners with ICR (Intelligent Character Recognition) capabilities. Xerox says its ICR software enables the scanners to read thousands of monospaced and proportionally spaced types in sizes from 6 to 24 point. Seven optional language packages, including Swedish and Dutch, add further flexibility.

For \$4,995, the Kurzweil

and graphics. The scanner outputs at resolutions ranging from 50 to 600 dots per inch, scales images from 20 to 500 percent of original size, and offers document rotation and multicolor recognition.

The K-5000 can convert documents to DCA, user-definable ASCII, Interleaf, or several word-processing formats. An angled bookedge facilitates scanning of bound documents, and a coprocessor with 4MB of RAM enables background ICR processing.

For scanning graphics, the \$1,995 Datacopy 730GS flat-bed scanner offers 64-shade gray-scale capability to PCs and

**PowerStation Integrates Financial Analysis and Desktop Publishing**

Alphametrix's *PowerStation* is integrated software for people who analyze time series or financial data and need to produce desktop-publishing-quality reports of their results. Users can configure the package to use any word processor and spreadsheet, and if they purchase the full system for \$2,300, they can choose between *Ventura Publisher* or *PageMaker* for desktop publishing. *PowerStation* automatically converts files among formats.

Also included is the *Modler* statistical analysis software, which, in addition to performing simple statistical functions, can create and manipulate large-scale simultaneous equation models. Reading data from disk as needed, as opposed to loading data into RAM, allows *PowerStation* to handle up to 800 observations on 150,000

data series at a variety of frequencies. Links are provided to download data from a variety of sources of economic and financial data, including Citicorp Database Services and Data Resources/McGraw-Hill.

Other modules include communications, graphics, and a database manager based on the *Dataview* engine.

The \$2,300 version of *PowerStation* provides read and write links with .WK? and .PRN file formats. Alternatively, the \$1,800 limited edition lacks the desktop publishing capability, and the \$895 basic edition further excludes the read/write capability to spreadsheet formats and communications linkages.

List Price: *PowerStation*, full system, \$2,300; limited edition, \$1,800; basic edition, \$895.

Requires: 640K RAM, numeric coprocessor, hard disk, DOS 3.0 or later. Alphametrix Corp., 11 E. Princeton Rd., Bala Cynwyd, PA 19004; (215) 664-6480.

CIRCLE 442 ON READER SERVICE CARD



The Kurzweil K-5000 with Xerox's Intelligent Character Recognition software can scan most text.

Discover 7320 Model 5 text scanner comes with format conversion software for many popular word-processing programs, including *WordPerfect*, *WordStar 2000*, and *Microsoft Word*. 2MB of on-board RAM, a 10-page document feeder, and ICR software are included with the scanner.

The Model 5 is upgradable in software, even to the capabilities of the new high-end Kurzweil K-5000. Xerox says the \$15,950 machine is intended for high-volume scanning of text

PS/2s. It has 27 levels of resolution, ranging from 60 to 450 dpi. Six halftone patterns built into hardware and 4- and 6-bit scanning options are provided to help save time and storage space.

List Price: Datacopy 730GS, \$1,995; Kurzweil Discover 7320 Model 5, \$4,995; Kurzweil K-5000, \$15,950. Xerox Imaging Systems, 1215 Terra Bella Ave., Mountain View, CA 94043; (415) 965-3474.

CIRCLE 441 ON READER SERVICE CARD

**Heath's Do-It-Yourself Laptop**

If you've got a yen to build your own laptop, for \$2,999 The Heath Co. will provide the parts for a Heath HS-2860, which is functionally equivalent to the Zenith SupersPort 286.

When complete, you have

an 80286-based 12-MHz machine with 1MB RAM (expandable to 3MB on the motherboard). Standard features include one 1.44MB 3½-inch floppy disk drive and a 640 by 400 supertwist LCD display. Heath says that the removable battery pack provides up to 6 hours of power.

A second floppy disk drive or hard disk drive (20MB or 40MB) is optional.

List Price: Heath HS-2860, \$2,999. The Heath Co., Hilltop Rd., St. Joseph, MI 49085; (800) 253-0570.

CIRCLE 443 ON READER SERVICE CARD



For \$2,999 you can build the Heath HS-2860, an 80286-based laptop with all the features of a Zenith SupersPort 286.

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# Wordbench Integrates High-Power Writers Tools in \$189 Package

PC HANDS ON

BY JONATHAN MATZKIN

Dorothy Parker once said, "I hate to write, but I love having written." Writing is excruciatingly hard work. Unfortunately, most word processors are no better than pen and paper when it comes to helping a writer transfer an idea to the printed page.

integration that lets them work together. If you use *Wordbench* to its fullest potential, these facilities focus and direct your effort.

If you begin with an outline, the power of the *Wordbench* approach really becomes apparent. Once the outline meets with your approval, you can go to the Notetaker and begin jotting down ideas. Each "note" can be associated with a headline of

working first draft, ready for editing. *Wordbench* keeps track of text that was created as an outline headline, and you can view the labels that were associated with this text.

It's important to point out, however, that you can elect to use the program as you see fit. If you want to jump in and start composing, you can go directly to the Writer and use it as you would any other word processor. The Outliner and Notetaker are still accessible when you want them.

*Wordbench's* extremely easy-to-use macro recorder can help you set things up your way. Composing macros—which the program coyly refers to as "shortcuts," is a simple matter of filling in a series of tables. With a cursory glance at the documentation, I was able to construct macros that jump me from the Writer to the Notetaker and back again with two key-strokes.

A viewer facility lets you pop up a window over a document and view another entity, whether it's an outline, a group of notes, or another document.

Among the other tools that *Wordbench* provides are spell checking, a thesaurus, and a system for developing footnotes and bibliography entries as you build your document. But the

outline. After developing some notes, you can elect to go back to your outliner and move headlines around. *Wordbench* automatically reorders your notes, provided they were associated with headlines.

When you are satisfied with your outline and associated notes, *Wordbench* will literally generate a first draft for you. From inside the writer module, you simply select the merge menu from the bar at the top of the screen. You can merge your outline or your notes, or both, directly into the word processor.

Outline labels are hidden, and the headlines are displayed as sentences that run into your document. The text of your notes is filled in—in order—under the headlines. Assuming you've constructed an organized outline, you now have a

PC FACT FILE

## Wordbench

Addison-Wesley Publishing Co., Inc.  
Route 128  
Reading, MA 01867  
(617) 944-3700  
List Price: \$189  
Requires: 256K RAM, DOS 2.0 or later.

**In Short:** A word processor uniquely optimized to harness writers' creativity. Integrates outlining, notetaking, and word processing. Not copy protected.

CIRCLE 450 ON READER SERVICE CARD



After you have finished developing your outline and taking notes, *Wordbench* merges these elements into an "instant" first draft.

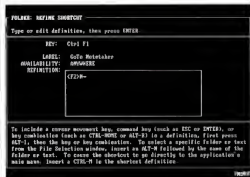
Addison-Wesley Publishing's *Wordbench* may be the first serious attempt to create a word processor specifically for writers. It lacks many basic business features, such as mail-merge and document conversion, and instead offers an array of tools that promote creativity, organization, and clear thinking.

*Wordbench's* main menu lists its basic tools: the Writer, a well-designed, menu-driven word processor; the Notetaker, an electronic deck of index cards, with database sorting and retrieval capabilities; and the Outliner. The add-in manager serves the same function as Lotus's add-in facility, and the folder manager keeps track of all the materials used to generate a piece of writing.

More important than any of these individual tools is the tight

add-in manager is perhaps *Wordbench's* most intriguing feature. The Brainstormer, a free add-in, takes a variety of routes to smashing writer's block. It will be very interesting to see what else Addison-Wesley or third parties come up with.

*Wordbench* is definitely not intended as a general-use business word processor. It has no graphics merge or font support, and there is no facility for converting documents to other formats. More-general complaints include the lack of context-sensitive help and the absence of a facility for loading several documents simultaneously. But anyone who does any writing at all will find it a tool well worth examining. [E]



*Wordbench's* novice-minded macro facility lets you simply fill out a series of tables to record command shortcuts.



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● = Yes ○ = No					
Maximum file size	Disk	Disk	Disk	Disk	128K
Thesaurus (integrated)	●	●	●	●	●
Windows Open (maximum)	6	2	8	1	1
Files Open (maximum)	24	2	8	1	1
Cross-Reference (dynamic)	●	○	○	○	○
Indexing Options	7	1	3	3	○
Columns: Parallel	●	●	●	●	●
Snaking (chg. * same page)	●	●	Not same pg.	○	●
H-P LaserJet Support	Full	Partial	Full	Partial	Full
PostScript Support	Full	Text	Full	○	Text
Mouse Support (integrated)	●	○	○	○	○
Dynamic Shortcuts	●	○	○	○	○
Alternative User Interfaces	●	○	○	○	○
Verify Spelling as you type	●	○	○	○	○
Programmable Macro lang.	●	○	○	○	○
Save File <sup>1</sup>	5.9	41.1	9.7	4.4	1.0
Top to Bottom <sup>2</sup>	7.5	7.5	49.4	8.1	21.0
Search and Replace <sup>3</sup>	1.6	6.6	4.6	17.1	13.4
Find Unique Word	3.3	6.2	7.0	13.8	20.6
<b>Suggested List Price</b>	<b>\$199.95</b>	<b>\$495.00</b>	<b>\$450.00</b>	<b>\$495.00</b>	<b>\$565.00</b>

Test results were performed on an Acer 286 (6 MHz), 640K RAM. <sup>1</sup>File size 100K. <sup>2</sup>MSB items. <sup>3</sup>14 occurrences. Times shown are in seconds. (Benchmark details available upon request.)

Prices and specifications subject to change without notice.

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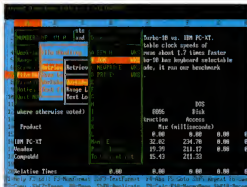
## PC HANDS ON

BY JONATHAN MATZKIN

Lotus 1-2-3 is the best-selling application in PC history, but not every PC user needs its full power. *Numbers Up*, a \$79.95 TSR spreadsheet from Mindscape, offers enough of 1-2-3's basic functionality to satisfy the occasional number cruncher.

While occupying as little as 12K of RAM, *Numbers Up* reads and writes .WK1, .WKS, and ASCII text files. Despite its parsimonious RAM consumption, it supports worksheets as large as 999 rows by 64 columns. Data beyond those limits is discarded.

The package minimizes memory usage by swapping overlays from disk or expanded memory. Loading large work-



Numbers Up, a \$79.95 TSR, reads and writes Lotus 1-2-3 worksheets in either .WK1 or .WKS format.

sheets, however, may necessitate an increase in the amount of memory that *Numbers Up* reserves for itself. That, of

course, slows down operation.

*Numbers Up* supports many 1-2-3 features. There are some important incompatibilities,

however. Macros created in one program, for instance, are not supported by the other. *Numbers Up* chokes on a number of 1-2-3 functions, and it doesn't support range names. Generally, you must keep these incompatibilities in mind when moving files between 1-2-3 and *Numbers Up*.

*Numbers Up* is no replacement for 1-2-3, especially for the heavy spreadsheet user. But for hundreds of dollars less, it gives basic spreadsheet power to users who don't need the entire Lotus dog and pony show.

**List Price:** *Numbers Up*, \$79.95. **Requires:** 256K RAM, DOS 2.1 or later. Not copy protected. Mindscape Inc., 3444 Dundee Rd., Northbrook, IL 60062; (312) 480-7667.

CIRCLE 431 ON READER SERVICE CARD

## Database Indexes Six PC Publications

## PC HANDS ON

BY LORI GRUNIN

KH Associates Information Services now provides monthly indexes of six computer publications: *PC Week*, *PC World*, *PC Magazine*, *PC Tech Journal*, *Infoware*, and *Byte*. The Index is a *FastBase Plus* database that contains a brief description of each article and basic information such as title, author, and publication date.

*MicroNewsIndex* is simple to use. Monthly data can be removed or added easily via the main menu. Each article is indexed by author, title, product name, product type, and vendor. Simple searches using AND or OR can be done on up to six keywords, and a context-sensitive list of keywords can be summoned for help.

If the assigned keywords aren't to your liking, you can change, delete, or add new ones. Since the database is in *dBASE III Plus* format, you can create a new search routine should the mood strike you.

For people who hold memory and disk space dear, *MicroNewsIndex* may be too expensive. The program requires about 400K to run, limiting its usefulness as a quick reference tool. The program files use 350K of disk space, and a monthly installment of all six

indexes takes up 700K—that means a 6-month database uses about 4.5MB.

You can subscribe to any combination of indexes and receive back issues from January 1, 1988. Price depends on the number of indexes, site licenses, and back issues you re-

quire.

**List Price:** *MicroNewsIndex*, annual subscription rates start at \$89; all six indexes (with no back issues), \$298. **Requires:** 400K RAM, DOS 2.0 or later. Not copy protected. KH Associates Information Services, 7474 Creedmoor Rd., #280, Raleigh, NC 27612; (919) 846-7059.

CIRCLE 432 ON READER SERVICE CARD

## \$95 TSR for Fast but Simple Stats

## PC HANDS ON

BY BARRY SIMON

*StatCheck* in an easy-to-use \$95 package that performs simple statistical calculations quickly. Unfortunately, it supports only four kinds of T tests, two ways of computing means and standard deviations, combinatorial coefficients, and two sample-size routines.

The program's richest features are its two ways of treating sample sizes. When you enter a sample size and a population size, *StatCheck* tells you the error interval. When you enter a de-

sired error interval and a population size, the package tells you the sample size you'll need.

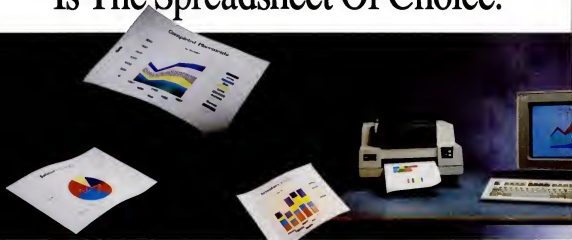
*StatCheck* can be run as a TSR, letting you pop up *StatCheck* over your word processor and do the computation on the spot. There are drawbacks, however. It takes up 105K of memory. And you'll have to make sure its Alt-S hotkey, doesn't interfere with hotkeys in your other applications and TSRs. It won't let you paste answers into your application, import data into the program in resident or nonresident mode, save any data that you've entered once, or remove the pro-

gram from memory.

If you have special sample-size needs and won't be bothered by copy protection that limits you to two installations, *StatCheck* may be for you. But for most who need quick stats, a better choice is *Dalin's \$199.95 Professional Wheel* (see *First Looks*, page 46, *PC Magazine*, March 29, 1988). **List Price:** *StatCheck*, Version 3.0, \$95. **Requires:** 256K RAM, DOS 2.0 or later. Copy protected. Detail Technologies, 29 Emmons Dr., Bldg. A-2, Princeton, NJ 08540; (609) 452-8228.

CIRCLE 433 ON READER SERVICE CARD

# It's Easy To See Why Quattro Is The Spreadsheet Of Choice!



In fact, it's hard *not* to see. Because one look at Quattro® shows you a lot more for your money. More speed, more power, and the most spectacular presentation-quality graphics anywhere—built in.

## Dazzling and diverse

If you went out looking, you'd be hard pressed to find spreadsheet graphics as dazzling and diverse as Quattro's. If you did, they'd be in a separate standalone package with a separate standalone price. And they still wouldn't be integrated with your spreadsheet's menu commands the way Quattro's are.

## Brilliance built in

Quattro lets you choose from 10 different types of presentation-quality graphs and a huge selection of fonts, fill patterns and colors.

Quattro supports PostScript® too. So you can use today's most popular laser printers and typesetters to make your work—and yourself—look positively brilliant.

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Quattro makes it easy to get hard copies of your graphics—with a printer or plotter, directly from the spreadsheet. In fact, you don't even have to leave the spreadsheet.

## Seeing is believing!

Dazzling graphics are just one of Quattro's eye-opening features; your dealer can show you the others. Quattro is easy to use and fully compatible; it even accepts familiar 1-2-3® compatible commands and uses data files created with other spreadsheets and databases. But Quattro gives you a lot more—in fact, twice the speed and power of the old standard. For only half the price.

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“Quattro contains the most comprehensive presentation graphics capability available in a spreadsheet ... The graphs Quattro can produce surpass even those available through add-on products like Lotus Graphwriter or Freelance Plus. If Borland wanted to, it could certainly sell the graphics portion of the spreadsheet on its own merit as a standalone graphics application.

*Robert Alonzo, Personal Computing*

Quattro's presentation-quality graphics output capabilities rival those that 1-2-3 can obtain only in conjunction with separate presentation graphics software ... For me, at least, Quattro has certainly become the character-oriented spreadsheet program of choice.

*William Zachmann, Computerworld*

In the few years since Lotus Development Corp. introduced 1-2-3, many companies have attempted to unseat the king of the spreadsheet hill. The latest contender, Borland International Inc.'s Quattro, succeeds where other spreadsheet packages have failed ... Quattro is at least two steps ahead of 1-2-3.

*Ricardo Birmele, PCResource* **99**



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CIRCLE 356 ON READER SERVICE CARD

## PC UPDATE

by Paula Seefeldt

### Freelance Plus 3.0 Adds Portfolio Feature

**Freelance Plus**, from Lotus, has added a Portfolio feature designed for use in creating presentations. Version 3.0 also has a redesigned charting module and Screen Show capabilities, to display presentations. **Freelance Plus 3.0** is closely integrated with **Lotus 1-2-3**, Release 3, and provides scanned image support and device-specific WYSIWYG. Upgrades are free to

Topic	File Path	Size	Filename	Print
1	MCN	100K	MCN	100K
2	MCN	100K	MCN	100K
3	MCN	100K	MCN	100K
4	MCN	100K	MCN	100K
5	MCN	100K	MCN	100K
6	MCN	100K	MCN	100K
7	MCN	100K	MCN	100K
8	MCN	100K	MCN	100K
9	MCN	100K	MCN	100K
10	MCN	100K	MCN	100K
11	MCN	100K	MCN	100K
12	MCN	100K	MCN	100K
13	MCN	100K	MCN	100K
14	MCN	100K	MCN	100K
15	MCN	100K	MCN	100K
16	MCN	100K	MCN	100K
17	MCN	100K	MCN	100K
18	MCN	100K	MCN	100K
19	MCN	100K	MCN	100K
20	MCN	100K	MCN	100K

**Freelance Plus** uses a Portfolio feature.

users who purchased **Freelance Plus** between September 6, 1988, and 30 days after the new version ships. Other registered users may upgrade for \$100. New packages retail for \$495. Lotus Development Corp., Cambridge, Mass.; (617) 577-8500.

### 3-D Graphics Expands Support

**3-D Graphics**, from Intex Solutions, now plots up to 30 percent faster on EGA screens. Version 1.02 also handles arrays of up to 1,500 by 1,500, includes enhanced color control, and supports VGA modes and dual screen configurations. Upgrades are \$25 and new packages retail for \$95. Intex Solutions Inc., Needham, Mass.; (617) 449-6222.

### Laser Print Adds Style Sheets, Allows Unlimited Font Changes

**Laser Print**, the LaserJet-oriented word processor from I.S.C. Industries, has improved its speed printing ability. Version 4.0 also provides typesetting with each page layout, style sheets for page formats, and an Open Architecture for soft fonts. Additional new features include an unlimited number of font changes and the ability to layer text and graphic objects. **Laser Print 4.0** retails for \$495. I.S.C. Industries, Chicago Ill.; (312) 286-5600.

### Intel Ships Free Diskettes

Intel's Personal Computer Enhancement Operation (PCEO) now supplies two Symantec **Q&A**, Version 3.0, diskettes with each Connection CoProcessor board. The software disks use the DCA/Intel Communicating Applications Specification (CAS) to enable users to communicate from within **Q&A** through the Connection CoProcessor board. Intel Corp., Hillsboro, Oreg.; (503) 629-7354.

### Primavera Offers New Resource Abilities

Primavera Systems is shipping new releases of the **Primavera Project Planner** and **Primavision for the VAX**. Version 3.0 of the products offer an expanded scheduling capacity and unlimited resource capabilities. In addition, they furnish a resource-loading report, alphanumeric activity identifiers, and a summary master project feature. The Primavera software pair is \$4,000 for the MicroVAX 2000, \$12,000 for the MicroVAX II, and up to \$30,000 for the VAX 8900 series. Primavera Systems Inc., Bala Cynwyd, Pa.; (215) 667-8600.

### The Norton Utilities Increase User Control

Peter Norton Computing has added a Norton Disk Doctor into **The Norton Utilities Advanced Edition**, Version 4.5. The Disk Doctor automates analyzing and repairing damaged disks. Both **The Norton Utilities Advanced** and **Standard Editions** Version 4.5, offer the Norton Control Center, which lets users control a range of system settings. A Batch Enhancer designs interactive batch files with zooming dialogue boxes and user input, and the Speed Disk has gained four user-selectable optimization methods. The Norton Troubleshooter guide is included with the **Advanced Edition**, and both editions provide the Norton Disk Companion. Upgrades are \$25 for the **Standard Edition** and \$39 for the **Advanced Edition**. The **Standard** and **Advanced Editions** retail for \$100 and \$150, respectively. Peter Norton Computing, Santa Monica, Calif.; (213) 319-2000.

### CD-ROM-based Encyclopedia Gets New Interface, Hypertext

Grolier Electronic Publishing has updated and renamed its CD-ROM title, the **Academic American Encyclopedia**. **The New Electronic Encyclopedia** sports an enhanced user interface, split-screen viewing, hypertext functions, and an on-screen clock. Up to ten text windows can be opened together, and screens



**The New Electronic Encyclopedia's split-screen**

are automatically numbered. Upgrades are available for \$100, and new packages retail for \$395. Grolier Electronic Publishing, Danbury, Conn.; (203) 797-3233.

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## COMMUNIQUÉS

edited by Bill Howard

## Dogs Howled, Little Children Cried, And the Sky Turned a Sickly Orange

"In the past year, viruses have 'infected' computers at NASA, the National Oceanic and Atmospheric Administration, information systems on Capitol Hill . . . They have slowed IBM's electronic mail system to a crawl and reportedly caused video monitors in Silicon Valley to burst into flames, apparently by speeding up the cycle speed of certain video functions."

—Associated Press story on viruses, June 9, 1988

## Flop the Wrong Disk, and Your Monitor Will (Reportedly) Burst into Flames

"The typical user is not likely to be affected [by viruses] because most people are not uploading programs from a network service, nor flopping diskettes with their friends."

—Computer & Software News, June 6, 1988

## Amazing Facts

"Digital circuitry of the same type that is used in computers and professional video equipment is being introduced in VCRs. DRAM (digital read and memorize) chips memorize and freeze a broadcast or taped image on the screen."

—Consumer Guide's "1988 Consumer Buying Guide"

### ACCESSORIES

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Microsoft	\$109

CPRI

Archie Bunker would be proud: if you don't have a slot free for a Hayes-compatible international modem, please add \$50 for the extraterrestrial modem with RS-232C connector. Master Systems Computer Center ad in The Kansas City Times, Aug. 2, 1988.

## Archie Bunker Would Be Proud

"Fig. 1. Misinformed character (bottom) resulting from soft plug formation. The top photo shows the character as it should be."

—Caption from discussion of ink jet printers, Hewlett-Packard Journal, August 1988

## Power of the PC

"Silver's second-floor home office illustrates the growing sophistication of the slow-growthers [Californian's favoring slower land development]. During a recent interview, Silver pecked out a 'browse' command on his WordStar 4.0 program and called up a list of the names, addresses and key leaders of 455 slow-growth organizations around the state."

—Los Angeles Times, Aug. 2, 1988



Maybe it runs Underwood DOS: COMB Liquidators' "Down-to-Business Catalog" shows a power user sitting at his desk with Syber's The MS-DOS Handbook and . . . a portable electronic typewriter.

### PRINTER INDUSTRY EXPECTED TO SHIP 8.4 BILLION PRINTERS BY 1992

According to a Dataquest Information Services survey, printer manufacturers will ship approximately 8.4 billion impact and non-impact printers by 1992, reaching \$10 million in revenue as early as

That's wholesale, of course (retail may be higher): if you run the numbers from this story in the August 1988 issue of PC Publishing (which also says 6.4 billion printers were shipped last year), you'll arrive at a per printer price of one-tenth of a penny.



Microport's new way to use the Genius mouse: upside down. "You simply draw a circle on the table and it becomes a circle on-screen. The mouse can also give automatic commands."



Computer Factory ad in the San Jose Mercury News (Aug. 7, 1988) calls the Apple IIGS "the most powerful member of the Apple family."

## Or Something Like That

"A disk drive is the device that reads information stored on a magnetic disk and then 'writes' it to the computer screen."

—Los Angeles Times, May 24, 1988



SO POORLY DOCUMENTED IS THE SOFTWARE THAT ROY IS BETA TESTING, THAT HE FAILS TO NOTICE THAT THE GAME RULES TO "TWISTER" HAVE ACCIDENTALLY BEEN INCLUDED.

Have you seen anything unusual or offbeat about the computer industry? Send your submissions to Communiqué, PC Magazine, One Park Avenue, New York, NY 10016. Contributors whose entries are used will receive \$50 and a PC Magazine T-shirt.

Winners this issue: Ralph Seligman (international modem), Roger Lemble (misinformed character), Steven W. K. Chan (Genius mouse), Richard Mercik (Apple IIGS), K. Vandenrood (8.4 billion printers), Mike Priore (viruses), Peter Dyke (flopping diskettes), Kerry Forsythe (slow growth), Alan Legatt (DRAM), and Larry Wasserman (disk drive defined).



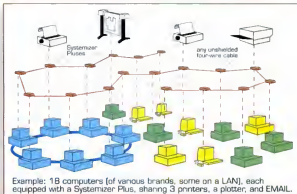
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You can create stunning screens like this with FoxBASE+/Mac—*immediately!* This actual FoxBASE+/Mac screen photo illustrates the View Window, Command Window, Integrated Graphics, Memo field editing, Trace and Debugging Facilities, and the BROWSE feature.

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■ BILL MACHRONE

# THREE TERMS THAT CONFUSED THE WORLD



*We worry so much about standards, and yet we have none when it comes to defining what we do for a living. Some key phrases have been mangled—almost beyond use.*

Our language is a magnificent jargon. The basic chassis and engine come from widely different places. Old parts are forever falling off, so we bolt new ones on in their places and then complain about how ugly they are and how the old ones were really better. But time is the best body shop. It smooths and polishes our new usages and neologisms until at last they sound natural. Of course, with so many mechanics, it's a wonder that our language works at all. Yet it takes us where we want to go with economy and style.

One term that's currently in need of an overhaul is *MIS/DP*. It's one of those words that has been overdefined until it's lost all meaning. Do we mean traditional mainframe data processing or all data processing within a firm, including that which takes place on our desktops? Shall we emphasize the MIS or the DP? All the way back at the beginning, remember, MIS was just a snazzy way for IBM to describe a class of people who owed their livelihoods to Big Blue.

**MORE BAD PRESS FOR MIS?** I know what you're thinking. Oh, there goes Machrone again, savaging the MIS department. Not this time. I just want to get some definitions straight. We meet people in our industry all the time who show us new products. We ask them, naturally, who their market is. They answer, "Oh, we just want to sell to MIS/DP." Do they really think that the people who should be interested in their product walk around with buttons in their lapels that say "MIS/DP"?

That attitude strikes me as a great way to limit your potential, as if no one else in the world is qualified to buy PCs or related products.

The easiest way to identify MIS/DPers is by their point of view. The die-hard old-line MIS/DP people see the world through mainframe-tinted glasses. Personal computers are viewed, at best, as smart terminals. At worst, they're seen as usurping elements to be either controlled or quashed, or as leechlike 3270 connections, sapping throughput with their nattering demands on the mainframe.

MIS/DPers also are convinced that they can understand and analyze other departments' work better than the professionals who do it, and they are determined to computerize it. This flawed, if romantic, notion has been the cause of untold human suffering. As with the Crusaders, their intent of converting heathens to the new religion was noble, but MISguided.



**USER BLUES** Then there's the term *end user*. Talk about meaningless. The term has come to mean, variously, "those who have no say in the machines they use or what they run on them," "those who get the fuzzy end of the lollipop," and "dumb schnook who barely knows what button to push."

This common thread of disdain is nothing new. Ten years ago, in my mainframe consulting days, our systems programmers were at the top of the food chain. They picked on everyone else with merciless glee. Rigby, who had a refrigerator next to his desk crammed with flats of Coke, would call across the room to his cohort, Larry, "Hey, Larry! What's dumber than a user?" Larry would chant his response in the ancient ritual, "I dunno. What?" Rigby would bellow, "Two users! Har!" Then he'd knock back another 6 ounces of his *aqua vitae carbonatum* and turn back to his terminal. Naturally, these exchanges took place only when we project managers were giving tours to prospective clients, including, of course, the poor, dumb end users.

What an ego builder! It's no wonder that personal computers became the ultimate expression of corporate self-determinism. It wasn't freedom, it was revenge. Here's some good advice for all you folks out there who look down your noses at everyone who can't recite the entire 80286 instruction set before a lit match burns his fingertips: lighten up. End users are the only kind of users. They're your customers and your clientele. Without them, you don't have a job.

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## ■ BILL MACHRONE

**TECHNICALLY SPEAKING** Finally, there's the knotty term *technician*. Everywhere in the world but in the U.S., *technician* means applied scientist or engineer. Here it means a wires-and-pliers type who helps out engineers. In the computer sense, it's a disparaging way of talking about a detail-oriented knowledge worker. This recent definition reminds me of how "analytical" graphics became a dirty word. When you say, in disparaging tones, that *Lotus 1-2-3* does analytical graphics, it means you wouldn't be caught dead making a presentation with graphs that *1-2-3* produced. When you call somebody a technician, you're implying that he or she is too caught up in things technical to see the forest for the trees. The further implication is that technically astute individuals are unqualified to make managerial decisions, even regarding the things about which they are so astute. It's time to stop this foolishness. The whole point of being technically astute is being knowledgeable enough about difficult topics to make informed decisions.

**CLASSACT** There's an undertone of resentment here—from computerphobic executives to business generalists—against the new elite: the information class.

And who are the members of the information class? The beleaguered, battered, and maligned professionals we've been discussing: MIS/DPers, end users, and technicians.

In fact, there's quite a significant overlap in the three categories. MIS isn't the enemy; some MIS'ers, however, are. Nowhere is the battle more pitched than between the PC and mainframe factions, even in the same department. Take an MIS'er out to lunch tomorrow. Discuss his problems. In solving his, you just may find a solution to your own.

Users, rather than being the passive recipients of someone else's solutions, have become self-determinative to an unprecedented degree. If vendors don't please the user—especially in the world of PCs—they don't have a product.

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■ JOHN C. DVORAK

# EISA COME, EISA GO!



*The promoters of the EISA bus rave about its backward compatibility and the fact that it uses bigger cards than the MCA bus does. Dvorak is not impressed.*

*EISA—Elementary Invention to Save America*

Watching The Gang of Nine—the nine vendors that spearheaded the new EISA (Extended Industry Standard Architecture) bus—has become a source of great amusement for me. At about the same time the bus was announced, I received two sets of press materials showing two versions of the edge connector setup. The preliminary design promoted by Zenith added more connections to the same card, while the Compaq solution (eventually chosen by the committee) was to add some new connections parallel to the AT connector. Both firms credited themselves for promotion of the EISA bus. The press gave the nod to Compaq for establishing the new standard. Bickering already, are they? I don't care who wants to take credit—it's a kludge.

It's a kludge *especially* with the parallel connector. I mean this is an edge connector, right? A force fit. So, now we have two edge connectors side by side that we have to ram into two sets of slots at the same time? Let's call it the K-bus for the kludge bus. Any mechanical engineer will tell you it's a dumb design. Hardly a great technological step forward.

If The Gang of Nine and the 70 yes-men (companies that immediately jumped on the bandwagon, no matter where it was headed) had any guts, they'd adopt something really new. No guts, no glory. Have you ever before seen so many people in massive agreement in this industry? This is nothing more than a sheeplike reaction to

IBM's intractable attitude about not giving away the MCA bus for everyone to copy. Nobody in this business wants to pay royalties for anything. It's a hindrance to progress, they all say. What they mean is a hindrance to profits. Of course, few of these companies make a contribution to progress, anyway. The EISA bus bandwagon is a perfect example of this.

Why didn't the group choose an advanced bus such as the NuBus (even Apple has enough moxie to use it) or the state-of-the-art Future Bus—a bus designed for the high-speed processors of the future? Both represent progress. The EISA bus is just a quick fix to add 32-bit data transfer and some DMA (direct memory access). It looks like it was designed solely to speed up those sluggish file servers on those sluggish networks! Worse, it is synchronous, thus requiring all sorts of timing considerations, and it appears to use slot addressing much like an old Apple II!



**BIGGER AINT BETTER** I'm amused how the promoters of this bus like to say that the bus uses bigger cards than the MCA bus, as though this were desirable. Why don't we all go back to the S-100 bus if we want huge cards? People want smallish half cards! They want surface-mount. Or haven't we noticed the trend toward small? The other important factor, they tell us, is the all-important backward compatibility (which seems to be some sort of rallying cry). Big deal. Why doesn't someone use a new architecture altogether and just chuck in a few old AT slots for the sake of compatibility? Make the rest of the machine totally new. Why does everyone want to keep the old zombie AT bus alive forever?

To make matters worse for the renegades is the fact that IBM has on the drawing boards an extended MCA bus that will accommodate the beloved 32-bit data transfer and who knows what else.

I have some advice for IBM. Let Compaq and the horde of stooges, laggards, and me-too artists tool up for the new bus. Spend some money. Then IBM should immediately roll out its EMCA bus and drop the royalty payments to nil. That should be an amusing exercise in futility for the EISA crowd.

Finally, Compaq says that this new bus will appear only in machines costing \$10,000 and up! Swell. EISA, the bus for overpriced file servers. Now there's a grabber of a marketing idea!

Personally, I'll be surprised if it ever sees the light of day. If it does, it will be crushed in the market. EISA creamed!

Illustration: Steve D'Amico

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■ JOHN C. DVORAK

# INSIDE TRACK

## *The Chang modification revealed!*

Apparently there is at least one company that managed to get hold of a **Chang-modified 286 card**. Mike Hess of TMC Research got one from a customer who went to Taipei even before I first heard about it. Hess writes the definitive explanation of the Chang modification in a letter to *PC Magazine*:

"The Chang modification is the addition of a large capacitor to the 14.318-MHz oscillation circuit of a standard 12-MHz SUNTAC chip set-based motherboard. The circuit provides the following functions: generation of the time base for the DOS timer circuit and the DRAM refresh request, and provision for the 14.318-MHz signal to the I/O slot. Adding the capacitor makes the clock act as if it were being modulated by a low-frequency component. This reduces the frequency of the 14.318 clock.

"Reducing the DOS timer frequency by half results in the appearance of having twice the actual speed. The proof for this is that the 14.318-MHz frequency on the I/O slot is used by most color and EGA cards but not by monochrome, which explains why the board has trouble with EGA cards.

"It's funny to imagine the cost-conscious cloners paying \$350 or \$400 for a \$225 motherboard. Dvorak should have saved this column for April Fool's Day."

The point is that the machine sees the world at half speed, making software think it runs twice as fast. In reality the software runs at the standard speed of the machine (12 MHz).

Yes, it's always fun to be snookered and then to be ridiculed in public for trying to do a good job of following new trends and ideas (sniff). The key mistake I made was not running the *PC Magazine* benchmark tests and a special program we have called "timing the timer." That

would have revealed the **trick**. I guess the Chang modification was just wishful thinking. When I arrived in Taipei everyone there already knew about it and **chucked** when it was discussed.

The fact is, the Taiwanese are producing engineers like there is no tomorrow, and we can expect to see more "interesting" and "creative" ideas from that part of the world in the decades ahead.

I feel so bad about this that I've resolved to write only about *dBASE*, *Lotus 1-2-3*, *Oracle*, *Agenda*, *Compaq*, and *Dell* from now on. (Hah! That will be the day!)

So the joke was on us (er, me) concerning the Chang modification. In return for this good humor, while in Taipei I managed to **radically affect the Chinese culture**—maybe permanently. I introduced into Taiwan the **plastic pocket protector**. Before going to Taipei I grabbed about 100 of those fabulous Dvorak/*PC Magazine* pocket protectors that I give away to fans and contacts (ask for one when you see me). The Chinese love to exchange gifts and I handed out the pocket protectors to the engineers who all **received them with great glee**.

I'm going to ship a couple more boxes of them over to Taipei in the next few weeks. Hong Kong and the mainland are the next targets.

Apparently these things are so rare in China that few engineers know what to do with them and need to be shown. Once shown, they are instant aficionados. I expect a **black market** to develop. Who knows what effect this will have on the society over there?

For more insight on Taiwan look for my Viewpoints column in the next issue of *PC Magazine*.

**More Talk About the 486 Dept.:** More and more people are talking about

the 486 and complaining about the industry going too fast for users to keep up. So what's the first thing I read in a transcript of a Bill Gates talk? Gates likes the 486 but says, "Wait until you see the 586!" Hey, guys. **Slow down!** I'm going to keep my 386 and wait for the 786. Whatever the case, we're hearing more and more talk about the early release of the 386-specific OS/2. Insiders think it may revitalize the industry. Nobody has explained quite how or why.

**Genuinely Interesting Newsletter Dept.:** I probably see more industry and user group newsletters than anyone, and I find few to recommend. At the top of the list, though, is the superb *Software Industry Bulletin*. Unlike the overpriced monthly pundit-type newsletters that dominate this business, this is a real 48-times-per-year newsletter that is a must read for anyone in the software business and for anyone who invests in technology companies. Forty-eight issues cost \$250 (from Digital Information Group, 51 Bank St., Stamford CT 06901; (203) 348-2751). **Highly recommended.**

**Genuinely Interesting Software Dept.:** Remember the old Epsom Valdocs software? Well, Carmel Computer Products is selling an MS-DOS version of the old Valdocs file-management system that allows you to create files with lengthy and descriptive names. People seem to like this and I'm sure it's handy in, say, a law office. I found that if you want to use this system you must dedicate yourself to it as it implements the once-hyped ASCII keyboard notions of ex-Epson/Rising Star wunderkind, Chris Rutkowski. No coincidence, since Rutkowski has reemerged as the owner of this smallish Carmel company. The software is worth a look if you can't stand the MS-DOS naming conventions. It's called *File Control* and it sells for \$59.95. Available from Carmel Computer Products, P.O. Box 7012, Carmel, CA 93921; (408) 659-3155. ☐



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■ JIM SEYMOUR

# DEAR SANTA: SOME BETTER LAPTOP PCs IN '89, PLEASE



*Don't expect jolly ol' St. Nick to leave the ideal laptop PC under your tree this year. However, next year just might be a different story.*

There is a noble (and not a little vain) tradition in the magazine business that year-end columns and stories—and sometimes entire issues—should look backwards, making sage observations about the year just passed and offering forecasts about the year to come.

In that spirit, let me offer a few thoughts about what I think has been most interesting in the PC business in 1988—and about what may, thanks to new technologies soon to become available, be the hot product category in 1989: lap-portable PCs.

This year we saw a plethora of new, more-or-less lap-sized machines. Among all of them, however, only two were really interesting, steps beyond the "me too" and "more of the same" mentalities that have so far held back laptop design and innovation.

The two interesting laptops of 1988 were Sir Clive Sinclair's Z88 and NEC's UltraLite. Neither is a very good general-purpose computer. Despite their limitations, they do show the direction laptop PCs will take in the next year.

**BABY SINCLAIR** I first saw the Sinclair in the hands of Bill Gross, the developer of Lotus's *HAL* program, at Esther Dyson's PC Forum in February. Bill had brought it back from England, where it was just then becoming available. My first reaction was to rip it from his hands and make for the door. Upon closer inspection, I decided to pass.

With a so-so LCD screen, rubbery keyboard, and way too many shortcomings to point out here, the Z88 isn't a serious com-

puter. Perhaps worst of all, it continues Sir Clive's eccentric love affair with Zilog's ancient Z80 chip—which means the thing isn't remotely DOS compatible.

But that's OK: I want a small, light laptop to use for note taking, word processing, keeping a calendar, and checking my e-mail when I travel. I can surrender DOS compatibility.

However, the Sinclair exceeds the patience of even the most broad-minded, generous computer user. There's no internal modem, and transferring files to MS-DOS machines is a mess. The built-in software is mediocre, and data storage is in klutzy, plug-in EPROM modules.

And yet, and yet... the Z88 is so small and light that it almost wins you over. Sure, the keyboard is rubbery—it's made of rubber. But the whole thing weighs just 2 pounds, is the size of a small stack of letter paper, and runs up to 20 hours on internal AA batteries. These are

the important specs for a laptop PC; DOS and the rest be hanged.

**A BRIGHT, LITE-HEADED NEC** On the NEC UltraLite. Introduced in early October, and in very short supply, the UltraLite is quite close to the ideal laptop PC form factor. At 4 pounds and less than an inch and a half thick—the size and weight of a full three-ring binder—it's larger and heavier than the Sinclair, but not much. Most important, the UltraLite speaks DOS.

And it understands the need to communicate with desktop PCs. One way is via the internal 2,400-bit-per-second modem; another is provided by Traveling Software's *Lap-Link*, which comes built into the UltraLite in ROM. This makes it genuinely easy to move files to and from your deskbound PC.

The UltraLite uses NEC's 8086-compatible V-30, a slow and not very powerful chip. This machine has 640K of RAM; in lieu of a floppy disk drive, it uses a combination of NEC-supplied ROM software cards and 1 or 2 megabytes of "silicon hard disk"—in other words, additional battery-backed RAM. (NEC says it will offer I-2-3 and other popular programs on proprietary ROM cards.)

The UltraLite shows brilliant attention to design and especially to detail. If you can live with that 1 to 2 megabytes of RAM instead of relying on real (physical) disks, and if you can buy your favorite software on NEC ROM cards, the UltraLite may be all the lap portable you'll need for the next several years.



## ■ JIM SEYMOUR

While both the Sinclair and NEC machines' intelligent form-factor design points the way for the next generation of lap PCs, neither provides nearly the power we want in true road dogs.

But sometime next year you should be able to buy battery-powered 286 and 386 lap-portable machines not much larger than these two, and perhaps as little as 50 percent heavier. New, fast 80286 chips us-

ing CMOS technology are becoming readily available, and *all* 386 chips are CMOS. That's an extremely important fact, because CMOS draws much less current than the NMOS-based microprocessors that have been available until this time . . . and battery life is still the weak link in lap PCs.

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**LAP YEAR?** The two remaining areas to be addressed in 1989 are the laptop's mass storage and display capabilities.

This fall, PrairieTek began showing its astonishing 2½-inch 20MB hard disk. Deliveries begin in the spring. This tiny drive, about 40 percent of the size of the smallest of today's 3½-inch micro hard disks, has the potential to revolutionize lap-PC design. With an access time under 30 milliseconds—how far can the heads move on those two tiny 10MB platters?—performance should be up to the level we expect in 286 and 386 PCs.

■ The 4-pound NEC UltraLite is quite close to the ideal lap-PC form factor.

Displays should also get a lot better next year. Instead of hearing rumors about new wonder-screens from the Orient, we're seeing great, innovative new products from companies like Planar Systems in Beaverton, Oregon. Look for thinner, brighter, higher-res LCDs with far lower current draws than today's ugly, hard-to-read versions.

Over the past few years enough people have written about such foolishness as The Year of the LAN that I'm reluctant to bet on any area of PC technology becoming the hot spot in any given year. But what I've seen delivered, prototyped, and sampled in 1988 leads me to overcome that prudence: 1989 is going to be The Year of the Laptop, the year lap-size PCs break out of the "journalists' curiosities" sideshow and into the mainstream of the modern PC market.

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■ STEPHEN MANES

# OF COURSE IT'S TRUE: MY PC SAYS SO



*Your computer presents itself as a veritable paragon of certainty, accuracy, and credibility. There's only one minor problem: What if it's wrong?*

**Q**uick! Channel 4! You've got to see this!" It was last year, during the World Series. My friend Paine was on the phone. You can always depend on an over-excitable cultural historian to alert you to trends.

"You watching?" he screamed. "Me and half-a-dozen light refreshments," I replied coolly. "We already had it on."

"You're not impressed?" "I might be if you let me hear it." Actually, I was impressed, but if you admit such a thing to Paine, you're in for a 2-hour disquisition.

The remarkable television event before us was a low-key commercial for an insurance company that boasts of its serenity. The entire screen featured nothing more than a "computer display" simulation of a graphical user interface that strongly resembled the Macintosh's.

At the top of the screen were four little boxes labeled "Last Year," "10 Years Ago," "30 Years Ago," and "50 Years Ago." A fat little arrow moved to the Last Year box; the audio featured a click.

Amazing! A bar chart appeared above the title "1987 Dividend Performance." Surprise! The bar for Equanimous Mutual Life (not the company's real name) appeared at the top, far longer than any of the four others below it. A highly impressed voice in the background said, "Nice. But what about 30 years ago?"

The arrow moved to the 30 Years Ago box. Another click. The title "1957 Dividend Performance" appeared below an-

other bar chart. "Equanimous Mutual again, huh?" said the background voice.

"They've even got a magazine version of this," Paine pointed out. "Spooky, or what?"

"Well, it won't beat Pee-Wee Herman. Or even the Pirates."

"Get serious. This is history. This has to be the first time ever that anyone has devoted the entire video of a commercial to what's supposed to be a computer display," Paine said.

"So?"

**CONCEPTUALLY SIMPLE** "Wake up and smell the cultural significance!" Paine shouted.

I tried: "For one thing, this means some advertising agency—to use your words, 'the mirror of America'—thinks that the point-and-click graphical user interface is either so common that everybody will instantly recognize it or so conceptually sim-

ple that everyone will be able to grasp it in a flash."

"Not bad for an amateur. What else?"

"The computer has finally arrived," I said, attempting a suitably academic pronouncement. "It has become such an integral part of our lives that we now take it for granted."

"You'd never get tenure," snapped Paine. "It's much worse than that. The computer is now a tool for pseudovalidation of reality."

"You really do have that academic flair," I said in admiration.

**BRING ON THE HORSES** "Television," Paine went on didactically, "seems to validate reality. People believe that if they see it on television, it must be true. Try and tell a 6-year-old that the new war toy isn't going to turn him into Rambo. Try and tell a 26-year-old that the new BMW isn't going to turn him into a member of the wealthy class."

"You mean they don't come with polo ponies in the trunk?"

"I'm working on an essay about that. But back to this insurance commercial: it piles validation on top of validation. You not only saw it on a television screen; you saw it on a computer screen. So it omits such salient facts as what happened 5 years ago—How could it possibly be anything but gospel?"

I sighed. Paine had beaten me to the story once again. The only good thing was that the publications he writes for have 2-year lead times.

"Now, you're supposed to know all



## ■ STEPHEN MANES

about this," he coaxed. "Do people really think they're getting the truth from their computers?"

"Of course," I said. "That's the whole point."

"I need some examples. Don't worry. I can't scoop you on this. You don't get academic points for scoops."

"Well, take computer graphics—please! The whole point of computer

graphics is persuasion—arranging data in the way that makes your point. And, when you get right down to it, most slide shows are intended for the same purpose as advertisements—to make a sale."

"Interesting. What you're saying is in those cases it's almost computers as television. With the benefit of the dual-validation mode."

"Spare me the jargon. But we do tend to assume truth. I mean, who in the world can possibly check a complicated spreadsheet program to see if everything works as advertised—which in some cases it doesn't? It's hard enough to be positive that your own numbers and formulas are right—which they often aren't. And then there's the never-asked question of whether a given model has any resemblance to reality—which, if you want to snow somebody, it may not."

"I'm writing this down. What else?"

"Well, there's always a question of how much you dare to depend on any program. Let's say you're a doctor using software that's supposed to warn you about drug interactions. What if somebody forgot to include a couple of new warnings in the database? Are you going to gamble your patient's life that every bit of the data and the program that uses it are both perfect? Or are you going to go to the printed book to double-check?"

"Of course, the book could be wrong."

"True. And later it can end up in computer form and compound the error. Hard to believe, but there's a ZIP code directory in *Microsoft Bookshelf* that has no idea that the big buildings in New York City have their own ZIP codes. Use it to address your mail, and the Post Office gets another excuse for its Depressed Mail Overmonth Service."

"So would you say any program might conceivably introduce errors?"

"Sure. And any large body of data may have them built in. Most people don't check. They can't check. They don't have the time."

Paine exhaled deeply into my eardrum. "You don't know how relieved I am to hear you say that."

"Relieved? Why?"

"The IRS is trying to nail me on tax fraud. I'm blaming everything on my computer."

# TRACON Air Traffic Control Simulator

*A game? Or a reflection of a deadly reality? It looks simple—just keep every flap on your scope apart as you vector them around for approaches and departures. But they keep coming, pushing you to your limits. And you alone must prevent a dreaded crash between airliners loaded with passengers.*

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FAA trainers compare TRACON with \$100,000 dollar ATC trainers. It gives you realistic traffic mix from Port Charles Boeing 747 "heavies" in any of two control sectors: Los Angeles, San Francisco, Miami, Chicago, and Boston. Yet no experience is necessary. A detailed manual, sample scenarios, and an audio cassette demo tape train you in ATC procedures and jargon.

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Returns: IBM PC or compatible with at least 256K and disk drive and graphics monitor. Monitor optional. Price of \$49.95 includes program on 5.25" and 3.5" IBM PC floppies, 10-page manual, version samples and an audio cassette tape demonstrating scenarios. Please add \$5 for shipping and handling. Texas residents add 8% sales tax. We ship the next day via UPS. Unconditional 30-day money-back guarantee if not completely satisfied. Just return it to us for a full refund. Dealer discounts welcome.

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EGA Screen Photograph of TRACON



# IF ANYONE TELLS YOU THEIR MOUSE OUTPERFORMS MITSUBISHI'S, THEY'RE SLIPPING YOU A MICKEY



We proudly present three reasons why Mitsubishi will soon be the mouse you'll see scampering across more and more desktops: **M-Mouse, E-Mouse and S-Mouse.**

These fast-moving, versatile mice are now showing up in every field in America. And with good reason. Because Mitsubishi understands the importance of building a mouse that meets the user's standards of speed, comfort and reliability across a range of DPI requirements. And with that in mind, we built three mice designed to provide you with performance that you can rely on time and time again.

**M-Mouse:** luxury features at a 200 DPI price — The Industry Standard.

Designed for a wide range of applications, the 200 DPI **M-Mouse** is completely compatible with all IBM or IBM-compatible PCs with serial ports. It features a rugged, two-button dual control system that uses reliable optomechanical encoding and single chip control circuitry. Best of all, **M-Mouse** fits comfortably in your hand and scoots along on Teflon™ feet and a silicon coated ball for incomparable movement response. No external power or special pads are ever required.

**E-Mouse:** the only 400 DPI serial mouse available.

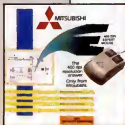
Combining microprocessor technology with super precise optomechanical technology, **E-Mouse** provides you with the highest possible resolution ever in a serial mouse—400 DPI. What's more, you can

connect it directly to your PC's serial port without opening your machine and using up valuable expansion slots. Just plug it in and go!

And **E-Mouse** is completely MicroSoft® compatible too. Its 15 pop-up menus let you control cursor movements even in applications that don't usually support mouse devices.

**S-Mouse:** the only variable resolution, hardware-driven mouse available.

For the first time ever, Mitsubishi offers a new-generation mouse that provides exponential tracking from 200 to 800 DPI. Armed with a self-contained microprocessor control, **S-Mouse** can go from 10 to 13.8 inches per second with just a flick of your wrist. It's perfect for window environments, graphics, desk top publishing operations and any other applications that require high resolution graphics and use today's new larger CRTs. And like all other Mitsubishi mouse devices, **S-Mouse** is comfort-designed for hours of fatigue-free operation.



Each mouse device can be purchased stand-alone, or bundled with any of the following programs:

*Dratrix/CAD, EGA Paint 2005, Byline 2.0*

To order or to find out more about Mitsubishi mouse devices, call toll-free:

**1-800-232-5727**

Dealer inquiries welcome too — call (212) 605-2607.



**Mitsubishi International Corporation**  
HI-Tech Components & Plastics Company  
520 Madison Avenue, New York, NY 10022

Desktop publishing  
is a high-stakes game.  
Legend,  
The Office Publisher,  
PageMaker,  
and Ventura Publisher  
put their cards

# POWER PUBLISHING

on the table and  
reveal their  
true strengths—and  
weaknesses.

Sometime, somewhere, when no one was looking, somebody upped the ante in the desktop publishing game. Programs that run on PCs are increasingly measured against professional publishing standards. These products are expected to do what the big boys do: provide sophisticated typographic control, high-resolution graphics, and quality output.

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*This duplication of our opening page was  
created in PageMaker.*

But the ideal DTP program (as yet unrealized) should do more than duplicate the features currently found on mainframe and mini systems. It should be able to take advantage of the PC environment to deliver added value.

Of course the program should control typography and page design with precision, but it should also be compatible with files from other business applications—like databases. In addition to importing a variety of graphics files easily, it should incorporate full-color images into documents.

Point-and-shoot menus, optional expert-level commands, and quality output via PostScript are now givens. Our

**These products demonstrate that reasonably priced programs can aspire to professional performance.**



new higher expectations include true WYSIWYG displays and network functionality.

If all this isn't enough to ask, it would be nice to find the perfect program available as an off-the-shelf product for about \$1,000.

Believe it or not, what at first glance seems like an outrageous wish list is actually a useful ruler against which the products in this review can be measured. The four programs reviewed here were chosen because they are beginning to provide many of the functions described above. All of the programs—*Legend*, *The Office Publisher*, *PageMaker*, and *Ventura Publisher*—address the concerns of serious publishers. These four programs contain the essential tools needed to produce a complicated document, whether it be a magazine, a financial report, a brochure, or a newsletter.

**SEGMENTING THE MARKET** Ranging from \$495 to \$895, these products demonstrate that a program can be reasonably priced and still aspire to a professional level of performance. Price, more than anything else, distinguishes them from most other high-powered DTP systems. For instance, Bestinfo's *PageWright*—an expanded and upgraded version of *Superpage II* ("Bestinfo's Superpage II: Beyond Desktop Publishing," *PC Magazine*, February 10, 1987)—now carries a price tag of \$12,900 for the standard package.

At the same time, the products reviewed here have features that differentiate them from the low and mid levels of the market. Programs like *Byline* and *GEM Desktop Publisher* ("Desktop Publishing's Inexpensive Upstarts," *PC Magazine*, April 12, 1988) just don't pack the necessary punch to face off with products like *The Office Publisher* or *PageMaker*. Low- and mid-level packages sacrifice features in order to provide a more gradual learning curve and a lower out-of-pocket cost. The \$300 or \$400 that you'll pay for a mid-level program won't buy manual kerning, high-resolution graphics, or table-editing functions—to cite just a few features.

Products like *PFS:First Publisher* or even *GEM Desktop Publisher* are designed for a person who needs DTP functionality only occasionally, or in a limited implementation. *Ventura Publisher* is not their intended competition.

Indeed, it is much more likely that *Ventura* will have to contend with a product like *IBM Interleaf Publisher*. *Interleaf*, which also addresses the professional and corporate market, is a heavy-duty program that was recently ported over to the PC from a workstation platform. For an in-depth look at the DTP system that has gotten the nod of approval from IBM, be sure to read "Interleaf: The Industrial-Strength Publisher" in this issue.

Without a doubt, the professional publishers and corporate users are the coveted prize, but to win that audience, the manufacturers behind *Legend*, *The Office Publisher*, *PageMaker*, and *Ventura Publisher* must meet its needs.

The phrase "desktop publishing" erroneously implies that a document is produced solely in one office, by one person.



## Pricing the Perfect Desktop Publishing System

**P**rofessional-level desktop publishing is not for the faint of heart or the light of wallet. Putting together a system that can be used to generate quality output can easily cost \$10,000 if you're starting from scratch. If you're willing to pay up to \$900 just for the software (or \$2,495 for *IBM Interleaf Publisher*), then you should have hardware that's going to make the program shine.

Under each of the four price levels shown here, we've made some hardware and software suggestions and listed the types of tasks each system would be capable of performing. Each configuration is followed by comments and hints that clue you in on the best way to spend your money, regardless of the price level at which you're shopping.



## \$3,000

**Tasks:** Create multicolumn documents and simple newsletters and posters for internal use.



**PC:** XT compatible with monochrome monitor, or a low-priced 286 such as the CompuAdd Standard 286/10 with monochrome graphics monitor and Hercules graphics adapter (\$1,238)



**Printer:** 24-pin dot matrix model such as the ALPS Allegro 24 (\$499) or the NEC Pinwriter 2200 (\$569)

**Program:** GEM Desktop Publisher (\$395) or Ashton-Tate's *Byline* (\$295)

- Never use a dot matrix printer for really serious DTP. If a dot matrix printer is all you can afford, try to find a laser printer to use for your final copy, especially for documents that involve graphics.
- At the very least, a Hercules adapter or EGA monitor should be used for all desktop publishing. CGA is barely passable. If you can, invest in a VGA monitor.
- Try to avoid using an XT; they're too slow.
- GEM Desktop Publisher and *Byline* are both adequate DTP programs but have limited WYSIWYG ability.
- In a nutshell, \$3,000 isn't enough money for serious DTP.

## \$5,000

**Tasks:** Newsletters, in-house reports



**PC:** A 12-MHz 286 such as the Northgate 286/12 with a monochrome graphics monitor and adapter card (\$2,199), or the Austin 286/12.5 with EGA monitor (\$2,395)

**Printer:** Hewlett-Packard LaserJet Series II (\$2,695)

**Program:** *PageMaker* (\$795)

- Now that you have added a laser printer and a serious DTP package, speed is the important factor.
- For your PC, comparison shopping is a must: there are plenty of bargains to be had.
- You need to include a mouse (any type will suffice) and Microsoft Windows, the environment under which *PageMaker* operates.
- Aldus now includes a Bistream font package with *PageMaker*.
- With extra money, invest in a Hewlett-Packard Z-cartridge (\$330) for your LaserJet, and consider a high-speed printer interface card such as the Matrix Instruments MVP Card (\$1,995) or Tall Tree Systems' JLaser Plus AT2 (\$699).

## \$10,000

**Tasks:** Newsletters, small publications, industry newsletters, high-quality in-house reports



**PC:** A 16-MHz 386 machine such as the WYSEpc 386 (\$3,799), or an affordable 20-MHz 386 such as the Core ATomizer 386/20 (\$2,995), and a large-screen, paper-white monitor such as the Taxan Crystal View (\$2,195)

**Printer:** Hewlett-Packard LaserJet Series II (\$2,695) or Apple LaserWriter IINT (\$4,599)

**Program:** *PageMaker* (\$795) or Ventura Publisher (\$895)

- The main cause of the price leap from \$5,000 to \$10,000 is the addition of a PostScript laser printer. PostScript is an extremely expensive option, but for serious desktop publishers, it is considered a necessity, not a luxury.
- For the best results, send your work out to a Linotronic 100, 300, or 500 PostScript typesetter for your final copy.
- Look for a high-resolution (800 by 800) color VGA monitor, and add the Compaq video card if you can afford it.
- With extra money, look for the NEC MultiSync XL monitor at a \$3,000 street price.
- Start thinking about scanners: the HP ScanJet (\$1,495) and the Microtek MSF-300C (\$1,995) are good choices.

## \$25,000

**Tasks:** Newsletters with art and graphics; long, sophisticated reports; quality publications; books



**PC:** A 25-MHz 386 such as the Compaq Deskpro 386/25 (\$10,299), the ALR FlexCache 386/25 (\$6,499), or the IBM Model 70-A21 (\$11,295); a large-screen, paper-white monitor such as Sigma Design's LaserView Plus (\$2,395) or the Taxan Crystal View (\$2,195)

**Printer:** For high-end printing, the Apple LaserWriter IINTX (\$6,599)

**Program:** IBM Interleaf Publisher (\$2,495), *PageMaker* (\$795), or Ventura Publisher (\$895)

- Use the Microsoft mouse or the Logitech DPI mouse.
- Use a high-quality black-and-white scanner like the Datacube 730 (\$1,800) or the Microtek MSF-300C (\$1,995).
- For color, the best scanners are the Barneyscan 35-millimeter scanner (\$6,700), the Howtek 300-dot-per-inch Scanmaster (\$6,195 with interface card), and the Sharp JX-450 color scanner (\$6,995).
- Use your printer only for proofing. Send your files out for Linotronic output on film, and send color images out for four-color separations. Have a printer combine the film and print the finished pages.

## ■ DESKTOP PUBLISHING

As a rule, one person writes the copy, another creates the images, and a third designs the format. Then the first decides to change it all.

Professional publishing, whether intended for internal corporate consumption or newsstand sales, is a group effort. Therefore, PC-based programs must learn how to operate—and provide extra functionality—in a network. Writers, editors, art directors, corporate designers, and CEOs all need a structured, controlled way to access common files. Of the programs reviewed here, only *Ventura* has a network version currently available. For example, the product can post an alert when a file within a chapter has been modified by someone else on the network.

Collaboration involves not only cooperation among workers, but cooperation among programs. Toward that end, DTP programs should be able to read and manipulate diverse file formats and data structures, including graphics files; *Microsoft Windows* Metafiles, for instance, should be accepted by all graphically oriented programs. More broadly, this graphics capability should extend to include database and spreadsheet files. Aldus Corp.'s move to import .WK1 and .DBF files directly and to manipulate those files in *PageMaker* is a major advance toward a truly integrated production environment.

This sort of information exchange, the kind that does not require the tedious conversion of files to "acceptable" formats, can serve only to expand DTP's role in the workplace. At a recent trade show for desktop publishing, I was intrigued by a new product (not yet on the market) called *dbPublisher* from Digital Composition Systems. It is basically a report generator that works with databases and spreadsheets. The program provides only basic desktop-publishing functions and a WYSIWYG preview. Instead of importing static information, however, it creates pointers to files that reside within other applications. The program gives you design flexibility, but the information within the design can reside anywhere on your computer. For example, you could create a financial report that you will print once a month. Each time you open the document, the program retrieves the most current information from your spreadsheet.



## High-End Desktop Publishing Software: Formats and Compatibilities

Desktop publishing programs exist to accept graphics and text files from other programs for formatting and page layout. Therefore, you'll want to know what graphics, word processing, and text-based programs are compatible with the desktop publisher you plan to buy.

This table lists the most popular graphics and text formats, with their

respective filename extensions, and indicates which programs are compatible with the four desktop publishing packages reviewed in this issue. The table also identifies each graphics package as vector- or raster-based. Vector graphics consist of lines or curves drawn from point to point, and raster-based images use a grid of pixels to form a bit map on the screen.

Graphics formats	File extension	Vector- or raster-based	Compatible DTP programs			
			Legend	The Office Publisher	PageMaker	Ventura Publisher
AutoCAD	.DXF	Vector	○ ●	○	○	●
Computer Graphics Metafile	.CGM	Vector	○ ●	○	●	●
Encapsulated PostScript	.EPS	Vector	○ ●	○	●	●
GEM Metafile	.GDI	Vector	○ ●	○	○	●
HP Graphics Language	.HPG	Vector	● ●	●	●	●
Halo DPE	.IMG	Raster	○ ●	●	●	●
Lotus Picture	.PIC	Vector	● ●	●	●	●
Macintosh	.PICT	Raster	○ ●	○	○	●
MacPaint	.PICT	Raster	○ ●	○	○	●
Micrografx	.DRW	Vector	● ○	○	○	●
PC Paintbrush	.PCX	Raster	● ●	●	●	●
Publisher's Paintbrush	.PCX	Raster	○ ●	○	●	●
Tagged Image File	.TIF	Raster	● ●	●	●	●
Windows	.PIC	Vector	○ ●	○	○	●
Windows Metafile	.WMF	Vector	● ○	○	●	●
Text formats						
Data Interchange Format	.DIF		● ○	○	○	●
dBASE	.DBF		○ ○	○	●	●
Lotus 1-2-3	.WK1		○ ○	○	○	●
Microsoft Word	.DOC		● ●	●	●	●
Multimata	.DOC		○ ●	○	○	●
Windows Write	.WRI		○ ○	○	○	●
WordPerfect	Any		● ●	●	●	●
WordStar	Any		○ ●	○	○	●
XyWrite	Any		○ ●	○	○	●

●—Yes ○—No

This kind of market differentiation is hinted at in the programs reviewed here. As you may have heard, *Ventura* and *PageMaker* address slightly different markets. *Ventura* is better at long, formatted manuscripts; *PageMaker* excels at shorter, more uniquely designed pieces. *Legend*, on the other hand, stresses its word processing functions in order to be viewed as a

document processor rather than a pure DTP program.

**FUTURE POTENTIAL** Desktop publishing programs are changing their role from specialized applications to general business tools. Understanding that transition is as easy as looking at the history of another product, *Lotus 1-2-3*, which

shows exactly how a program can change its stripes from vertical market to horizontal application.

At first, 1-2-3 had to prove its worth to the professional accounting community. And it did. Then it went through a boom period where everybody and his brother bought a copy and became an instant financial analyst. User demand subsequently spawned a whole new industry built around 1-2-3 add-ins. Everyone I know uses at least one utility that provides extra functionality from within 1-2-3.

The DTP market has lived through phases one and two, and it should come as no surprise that Aldus is actively working on ways to integrate third-party programs into *PageMaker*. In fact, one independent company has already developed a utility to handle full-color photos. Cyber Research can display within *PageMaker* a black-and-white .TIF image that is tied to an Encapsulated PostScript file of a full-color photo. The .TIF image can be displayed on-screen, cropped, rotated, and sized, but the final film uses the color information in the .EPS file. *Ventura* has spawned an active aftermarket as well.

Following this metaphor to its final conclusion brings us to *Microsoft Excel*. *Excel* demonstrates that applications programs can and will incorporate presentation and DTP functions as they learn to operate within graphics environments. *Windows*, *GEM Desktop Publisher*, and *OS/2 Presentation Manager* all furnish a consistent, graphically oriented user interface.

**BENEFICIAL ENVIRONMENTS** The benefits don't stop there. The functions found in a program like *dbPublisher*, which shares information with other programs, could be duplicated in the *Windows* environment. DDE (Dynamic Data Exchange) is a spec that allows two *Windows* applications to exist in a client/server relationship. There is no reason *PageMaker* or *Legend* should not include support of DDE.

Other advantages of the *Windows* environment include the screen and printer drivers supplied by the Microsoft and Digital Research operating systems. Printer drivers are important because they control the quality of the final output. The entire purpose of electronic publishing is, after

all, to improve the quality of good old-fashioned ink on paper.

All four programs included in this review have the ability to produce PostScript files; this was one of our criteria for inclusion in this review. PostScript, a page description language that has become the de facto standard for the desktop publishing industry, has critics who point out that as an interpreted language it executes slowly, and our testing proved the truth of that statement. The sample newsletter we used contained a significant number of graphics files, and it took quite a while to print.

Nevertheless, the benefits of PostScript far outweigh its limitations. As a resolution-independent PDL (page description language), PostScript can write the same file to a 300-dot-per-inch laser printer, or to a 1,200-dpi professional typesetter. In either case, whether the printer is an Apple LaserWriter or a Linotronic 300, the peripheral must contain the intelligence to interpret the PostScript code. That intelligence costs money (about \$2,000) because in order to include the necessary compiler with the printer, the manufacturer must pay a licensing fee to Adobe Systems, PostScript's developer. Thus, a commitment to PostScript is a commitment to expensive peripheral equipment.

PostScript has been pivotal in the success of desktop publishing, and its influence continues to grow. Two of the more pressing DTP issues right now are Color PostScript and Display PostScript.

Color PostScript, a new version of the page description language, enables PC-based systems to output full-color images to a properly equipped printer. For example, the QMS ColorScript 100, a \$25,000 printer, uses thermal transfer technology to generate PostScript color prints. The PostScript language can also be used to generate individual printing plates for each of the four primary colors; the separate cyan, yellow, magenta, and black plates can then go directly to a printing press.

Separate challenges are posed by flat areas of solid color, areas of color tint (say 15% saturation), and full-color photographic images. The Apple Macintosh-based programs like *Quark's XPress* can do it all. These programs use the Mac's 16MB of directly addressable memory to handle everything from tinted text to

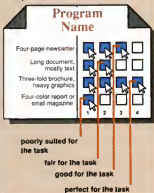
scanned, full-color photographic images.

*Legend*, *PageMaker*, and *Ventura* currently possess only rudimentary color capability. Consequently, although you can mix colors on-screen, the colors are only flat tinted areas. And the film these programs generate is not ready for the printing press but must be enhanced by conventional means. At the moment there is no easy way to produce full-color photographic images on a PC.

Display PostScript is intended to do for monitors what PostScript did for printers. Manufacturers would have to license the interpreter from Adobe and include it in smart monitors. The monitors would then be able to produce an interactive screen

## PC MAGAZINE Suitability to Task

We asked our reviewers to rate each program's suitability for the accomplishment of four different tasks: a four-page newsletter like the one we used for our performance tests, a long document consisting mainly of text that needs to be formatted, a three-fold brochure or advertising flyer that's heavy on graphics and design, and a glossy four-color annual-report-style document or small magazine. The possible ratings are: 0 = completely unsuited for the task, 1 = poorly suited for the task, 2 = fair for the task, 3 = good for the task, 4 = perfect for the task.



## WRAPPED ATTENTION

*A beautiful report created with a desktop publishing program deserves to be bound into a high-quality cover. Inexpensive binding machines do the trick.*

You've just spent 3 days slaving away with a complicated desktop publishing program to produce a 25-page report for the chairman of the board. What are you going to do with the loose pages in your hand? Put a staple in the corner? Submitting a beautifully prepared report without a binder is like serving a cake without icing. Here's where report-binding machines come in: they can give your work a sharp exterior to match the high-class copy inside.

VeloBind offers binding equipment in a wide range of prices and capabilities. The inexpensive Personal VeloBinder binds up to 45 pages and costs just \$60, while the Model 323 handles up to 750 pages and is sold for \$3,595. The two systems that are best suited for desktop-published documents are the Personal VeloBinder and the medium-sized Model 111.

The \$60 Personal VeloBinder Starter Kit includes everything you need to bind 16 documents. After punching holes in your document, you insert a pronged plastic strip through the holes. The prongs fit into a receiving strip and are bent into place using a VeloBinder tool. The strips, which clamp together tightly, are removable so your document can be enhanced or abridged at any time.

The Model 111 binds documents up to 250 pages and costs \$595. After snapping the handles onto the machine, you punch holes in the document and then


**FACT FILE**

VeloBind Inc.  
47212 Mission Falls Ct.  
Fremont, CA 94539  
(415) 657-8200

**Personal VeloBinder**  
List Price: \$60  
CIRCLE 678 ON READER SERVICE CARD

**Model 111**  
List Price: \$595  
CIRCLE 679 ON READER SERVICE CARD

**1-Step**  
General Binding Corp.  
One GBC Plaza  
Northbrook, IL 60062  
(312) 272-3700  
List Price: \$99  
CIRCLE 677 ON READER SERVICE CARD

wrap the folder in a binder and press the levers. The prongs are cut to fit instead of bent, but a debinder is included with each model so that documents may be updated. Both the Model 111 and the Personal VeloBinder are small enough to be kept wherever the documents are produced, whether it be near a laser printer or a copy machine. The Personal VeloBinder is even small enough to fit in a desk drawer.

Additional document covers cost \$1.08 for composition style, 48 cents for linen style, and 58 cents for transparent style. Binding strips for these systems

cost 40 cents for 1-inch-thick documents and 32 cents for 1/2-inch-thick documents.

VeloBind also manufactures the Model 223 for \$1,295 and the Model 230/292 for \$2,250. Both products bind documents up to 500 pages.

General Binding Corp.'s 1-Step is billed as the world's first Electro-Conductive Binding System; it adhesively binds up to 30 loose pages in about 1 minute. At a cost of \$99, it's as simple to use as a stapler. You simply slide the document and the glued cover into the pocket of the 1-Step and plug the machine in. A glowing light goes off when the copy is bound. The 1-Step method melts the adhesive of the folder by sending a low-voltage current into the cover itself, and the result is a strong, permanent bind. One nice surprise: the 1-Step is just 12 inches square and only 1 inch high, making it small enough to fit into a bookshelf or a briefcase. Additional covers for the 1-Step are 99 cents each.

In future months, you'll be more likely to find VeloBind or 1-Step machines in electronics stores and PC dealerships as marketers make the connection between desktop publishing and report binding. Until then, check your local office supply store to see the binding machines in action. —Ilona Price

*Ilona Price is an editorial assistant at PC Magazine.*

display that exactly mimicked the printout. Typefaces and interletter spacing would finally be accurate on-screen. In addition, EPS (Encapsulated PostScript) files would be displayed on the screen. This is a goal that is just not achievable now. Not until monitors use the same code as printers will we have access to true WYSIWYG design.

The importance of WYSIWYG display

should not be underestimated. With WYSIWYG you don't have to be an art director to design because you needn't be able to visualize what a type spec will look like. You simply choose it from a menu and immediately see the result. If it turns out to be ugly, you can just change it to something more appropriate. Without a true WYSIWYG display, however, you can never be sure that what you see on-

screen is what will print on paper.

At best, Display PostScript is problematic for PCs, where we have more video standards than you can shake an adapter at, but Adobe is finding some small success with Display PostScript in the Mac environment. We can only cross our fingers and hope for a monitor manufacturer who is willing to produce the Apple LaserWriter of the video world.



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# Qume.

The Company with Peripheral Vision

CIRCLE 361 ON READER SERVICE CARD  
DEALERS CIRCLE 746 ON READER SERVICE CARD

**TEST TIME** Understanding the broad issues that surround and inform desktop publishing is no substitute for hands-on testing. For this issue, we have redesigned our sample newsletter to provide a more challenging test of these powerhouse programs. The inclusion of several .TIF files assumes that programs can handle higher-quality graphics files. In addition, we've required that the programs import a number of different file formats, and we've included a downloaded Adobe font in the newsletter.

One major rule has changed: when a product could not perform a task as specified in the design, we have left a blank. So you'll find that the GEM programs could accept files created in Windows applications, but not vice versa. This incompatibility is more a matter of Microsoft's prejudice than any technical shortcomings, but an interesting point nonetheless.

The PC Labs test configuration included an 80286 IBM AT running at 8 MHz, an EGA monitor, a mouse, and a PostScript printer. We used expanded memory when suggested by the installation guidelines for a given product. Although this system configuration is still the most common one used for desktop publishing,

**All the programs  
had success with a test  
newsletter that  
was designed to choke  
lesser programs.**



you'll really want a processor that runs at 20 MHz, which usually means a 386. You might also find it handy to have a large-screen paper-white monitor if you're not producing color files.

PageMaker and Ventura Publisher were obvious choices for review in a story about high-end desktop publishing. The Office Publisher and Legend were also included because of their extensive range of features and their ability to output to Post-

Script. All the packages had success (on different levels) with a test newsletter that was designed to choke lesser programs like those we reviewed in April ("Desktop Publishing's Inexpensive Upstarts").

The reviews are arranged in alphabetical order by product name, and segments of the test newsletter are reproduced to illustrate some of the high and low points of each product.—Luisa Simone



**L**egend is a fairly new entry in the desktop publishing field, and it attempts to distinguish itself from the competition by coining a new term: *document processing*. A document processor should provide powerful design tools and easy text-editing functions to give you total control over long or complicated manuscripts, especially when it comes from NBI, a company that is best known for its dedicated word processors and document management systems.

I like the theory. Sadly, Legend (\$695) does not do justice to the concept. Quite simply, I found Legend's menus poorly organized, its performance woefully inadequate, and the program itself buggy.

**FATAL FLAWS** Legend's most serious problem is that it crashes a lot. A common sight on the screen is a message that informs you of an error at address 600c. You are then faced with the dilemma of exiting the program—and losing all your work—or saving the file. NBI's tech support people suggest saving your work to a new filename; that way, if the file has been trashed, you can discard it and go back to the previous version. Although the tech support staff was as helpful as possible un-

der the circumstances, this was an inadequate response: users deserve a fix to the code, not a strategy to avoid overwriting a good file with a garbled document.

Legend's second most annoying fault is its inability to write intelligently to the Microsoft Windows screen. Legend responds to every change you make by rewriting the screen. But it will often refresh the screen only partially—which means that little dots of screen junk will obscure body text, or a rule will mysteriously disappear. Usually nothing is really wrong with the file, and you can prove it by choosing Redisplay from the menu. When Legend executes the command, the body text becomes legible and the rule reappears. This may sound simple, but it is annoying and time-consuming. When working with the PC Labs test document, for example, Legend took about 20 seconds to rewrite an average screen. That's more time than Ventura takes to open a four-page document.

Legend performed poorly on the timing tests with PC Magazine's test newsletter. In fact, it was the slowest program in three of our performance tests: opening a file, saving a file, and turning a page.

The program also had difficulty dealing with graphics files. Part of the PC Labs testing script required that I import the Jet-set logo into the newsletter a number of times using different file formats, including .EPS, .PIC, .DRW, .WMF, and .PCX. Legend successfully imported only the .PIC and .DRW files, which were created in Micrografx's Designer.

When asked, NBI's technical support staff explained that Legend supports "true" monochrome .PCX files. Not only must the image be black-and-white, it must also be created on a computer configured as a monochrome system. Legend cannot import a black-and-white .PCX image created on a computer with a color adapter. This kind of supersensitivity to file formats is simply unacceptable.

Legend is missing several other features that are essential for the easy manipulation of page elements and graphics images. In order to know whether you are in text or graphics mode, you must display an optional status window that eats up valuable screen space. In addition, Legend does not allow you to display a ruler along the top

(continues)







# Power



*T3200: 20MHz 386 processor, 2 internal IBM<sup>®</sup> compatible expansion slots, VGA gas plasma display with VGA monitor port, 40MB or 100MB hard disk, 2MB RAM standard expandable to 8MB, 1.44MB 3 1/2" diskette drive.*

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*T1600: Battery-powered 286/12MHz, coprocessor socket, 20MB hard disk at 27msec, 1.44MB 3 1/2" diskette drive, 1MB RAM expandable to 5MB, detachable backlit EGA compatible LCD, removable rechargeable battery pack.*



# Surge.



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less and do more. So you can work wherever you want and however you want.

All of which might make it tempting for some people to abandon their desktop for the convenience of portability. Go ahead.

We've given you the power to do it.

*T3100A: 12MHz 286 with 80287 co-processor socket, internal half-length IBM slot, 20MB hard disk with 27 msec access, 1MB RAM expandable to 5MB, gas plasma display, L44MB 3 1/2" diskette drive.*



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# Our Test Document: *Legend*

December 1988 Your monthly guide to the best the world has to offer Vol. 1 No. 12

SHOPPING SPREE:

## THE LATEST FROM HONG KONG

BY TIMOTHY SMITH

While waiting making the same point here is a thing, the last by someone nearby. Remember Hong Kong is in the same vicinity as the British.

Recent shopping was off a one of the most are continued shopping, where in get a full the price before playing into the most intense area in Hong Kong. Among the best

choice is the Landmark on Hong Kong Island. Packed with thousands of upscale boutiques, this is where you'll find a full selection of European designer clothing, American designer and Italian goods. The company is renowned for its variety in men and women's clothing.

If you're the shopping man in the West you'll find the

Company, where you'll find some shopping. Chinese and Japanese designers' clothes are in the best designer store.

Again, the better you do the New Party that is, however, you'll find the largest shopping

(Continued on page 1)

INTERVIEW:

### CHRISTOPHER MC DONOUGH

#### Fitch-Wellington Stores

BY JIN CANARD

London-based Christopher McDonough has been Chief and Managing Asian Operations of the Fitch-Wellington group of Singapore since 1986. Fitch-Wellington has had branches in Tokyo, Singapore, and Hong Kong since 1984. Recently, McDonough shared his views

of his unique views on Hong Kong shopping as he describes in the following interview.

Q: Hong Kong is a Chinese city, but you are an American. How do you see the shopping scene in Hong Kong?

A: Only when they find what a little bargain. Our

(Continued on page 1)

Like *The Office Publisher*, *Legend* doesn't maintain the aspect ratio of imported graphics. The image can be scaled to fit, but if the layout is tight and you have to restrict its borders, the image may appear slightly squashed.

BY TIMOTHY SMITH

*Legend's* strengths as a word processor come in handy in design elements like this byline. It's simple to set up a single type spec that includes rules above and below the name.

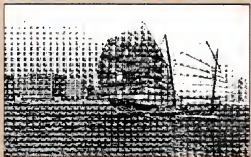
*Legend* doesn't offer manual kerning, so you have to depend on uneditable kerning tables to space your text. Combine that with the lack of irregular text wrap, and the result is exceptionally loose text around the image.

Hong Fitch-Wellington is a British store. Do you find that Britons who've traveled so far will shop at a store that reminds them of home?



A: Only when they find rather a good bargain. Our crowds are mostly

*Legend* takes .TIF files and converts them from 300-dpi resolution to 150 dpi—half the capability of a laser printer. The resulting output is far less sharp than that of the other packages.



## JETSET

December 1988

Your monthly guide to the best the world has to offer

Vol 1 No 12

SHOPPING SPREE:  
THE LATEST  
FROM  
HONG KONG

BY CHRISTOPHER MC DONOUGH  
Fitch-Welington Stores

London, the producer  
comparisons of nature and  
water make modern walking  
the most pleasant. But it is  
during the rainy season  
months. Sometimes, Hong  
Kong is in the most beautiful  
in the future.

Learn shoppers may still  
and so the way to be confident

Shopping centers to get a feel  
for prices before plunging into  
the merchandise store to buy  
baggage. Among the best  
choices in the Landmark Hong  
Kong Island Park  
with hundreds of specialty  
boutiques, this is where you'll  
find a full selection of

European designer clothing,  
handbags, shoes, and  
accessories. The complex is  
accessed by walking to  
central business in the city.  
If you can't do it all, you  
can go to the Lane 1000  
shops, which are in the  
city.

(Continued on page 13)

CHRISTOPHER MC DONOUGH  
Fitch-Welington Stores

BY CHRISTOPHER  
McDonough has been General  
Manager of Fitch-Welington  
Stores since 1985. He is a  
graduate of the University of  
California, Berkeley, and has  
worked for 15 years in Hong  
Kong. He is currently a  
senior advisor to the  
Fitch-Welington Stores.

in Hong Kong shopping is an  
experience in its own right.  
The city is a  
shopping center, but with  
all the shopping centers  
of Hong Kong, it is a  
shopping center. The city  
is a shopping center, but  
with all the shopping  
centers of Hong Kong, it  
is a shopping center.

Q: Hong Kong is a  
shopping center, but with  
all the shopping centers  
of Hong Kong, it is a  
shopping center. The city  
is a shopping center, but  
with all the shopping  
centers of Hong Kong, it  
is a shopping center.

A: Only when you  
visit Hong Kong. The city  
is a shopping center, but  
with all the shopping  
centers of Hong Kong, it  
is a shopping center.

(Continued on page 12)

This headline is written in *The Office Publisher's* own Helvetica font, not in the imported Adobe Franklin Gothic font the other programs used. To import an Adobe font in *The Office Publisher*, the user must write a PostScript program.

*The Office Publisher* had some trouble with the tricky three-column/two-column layout of page 2. When the graphic was included, the text didn't pour correctly around it. A blank line interrupts the story because the text below it is actually in a separate frame.

## O VISIT?

were'n't worried. They had budgeted \$200 a day for the two weeks. It wasn't enough.

Their plane touched down on the same day that the dollar posted at the yen. Their money, which was all in U.S. travelers checks when it arrived, was worth less.

"The first thing we found out," said Mrs. Peterson, "was that the dollar about 20 percent more expensive than we had expected, almost immediately decided to stay for a few days but to look for a smaller inn. We eventually found a few, but they were all terribly inconvenient and decided against them.

"The big problem was food. A typical American-style breakfast

(Note: cannot import)

INTERVIEW  
(Continued from page 1)

One important feature that is missing from many desktop publishing programs, including *The Office Publisher*, is automatic "continued on" and "continued from" lines. This line was created manually and resides in its own frame.

Though *The Office Publisher* does not use object-oriented art, it does have an image library from which art elements like these rules can easily be grabbed and added to the layout. The Jetset logo appears squashed because it has not been cropped to fit the space.

Item	New York
Deluxe hotel room	\$180.00
Full hotel breakfast	\$15.00
Reebok aerobic shoes	\$49.99
Honeydew melon	\$1.29

To make a chart in *The Office Publisher*, a table frame that supplies the grid is overlaid with a text frame containing the data. There is no guarantee, however, that the text and the grid will line up correctly. The item column here is in a separate frame from the New York column. An extra-thick vertical line is created where the two tables abut.









## Our Test Document: A Perfect PostScript Printout

Compare this PageMaker-produced page from our test document to the samples from *Legend*, *The Office Publisher*, *PageMaker*, and *Ventura Publisher* that were printed out on a laser printer. The output device used to generate this sample was a Linotronic 300, a professional-level typesetting machine that prints PostScript code at 1,270 dots per inch instead of the usual 300 dpi. The difference is most obvious in the .TIF file photographs, which come out with excellent resolution. The inclusion of the .TIF files is also the main reason that producing this page on the Linotronic takes 1 hour and 5 minutes.

# JETSET

December 1988

Your monthly guide to the best the world has to offer

Vol. 1 No. 12

## SHOPPING SPREE: THE LATEST FROM HONG KONG

BY TIMOTHY SMITH

This month, JET SET focuses on shopping in Asia. Our lead story, shopping strategies for Southeast Asia's busiest city, Hong Kong. Though any time is a good time to stroll the endless malls and arcades of Central and Kowloon, the moderate temperatures of au-

tumn and winter make outdoor walking far more pleasant than it is during the sultry summer months. Remember, Hong Kong is at the same latitude as the Bahamas.

Smart shoppers start off in one of the vast air-conditioned shopping centers to get a feel for prices before plunging into the more obscure areas to hunt



bargains. Among the best choices is the Landmark, on Hong Kong Island. Packed with hundreds of upscale boutiques, this is where you'll find a full selection of European designer clothing, handcrafted luggage, and leather goods. The complex is connected by walkway to several hotels in the area.

If you ride the old street tram to the east you'll run into Causeway Bay, where you'll find some interesting Chinese and Japanese department stores. Shoes may be the best bargains there.

Across the harbor near the

(Continued on page 3)

### INTERVIEW

## CHRISTOPHER MC DONOUGH Fitch-Wellington Stores

BY J. N. CANARO

London-born Christopher McDonough has been General Manager, Asian Operations, of the Fitch-Wellington chain of department stores for 16 years. Fitch-Wellington has had branches in Tokyo, Singapore, and Hong Kong since 1964. Recently, McDonough shared some of his unique views on Hong Kong shopping in an in-

terview at his Kowloon headquarters.

Q. Hong Kong is a Chinese city, but with an amazingly international collection of shops and shoppers. Fitch-Wellington is a British store. Do you find that Britons who've traveled so



far will shop at a store that reminds them of home?

A. Only when they find rather a good bargain. Our crowds are mostly American. You see, I find that most Americans long to acquire a certain British style whereas the Brit-

ish strive for an American look. While Londoners are at the Ralph Lauren outlets, Americans are in my store buying cashmere sweaters, Burberry trenchcoats, and Liberty of London neckties. Quite remarkable, actually.

Q. So Americans come to Hong Kong to imitate in a little British style whereas the Brit-

(Continued on page 2)

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TWIST!  
DO THE  
TWIST!



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CIRCLE 743 ON READER SERVICE CARD

## ■ DESKTOP PUBLISHING

and side of the screen. It does not display the page grid. It does not indicate the coordinate position of your cursor. And it does not let you rotate images.

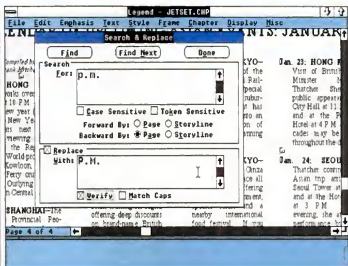
*Legend* does contain basic color functions—you can mix colors for any text element or fill pattern. An interesting feature allows *Legend* to edit images created with *Designer*. Most page-design programs give you the ability to position, crop, and size graphics files. With *Legend*, you can also edit a *Designer* file—using *Legend's* drawing functions. I imported the test logo and then selected the first letter. (*Page-Maker*, for instance, would not be able to recognize the letter *J* as a distinct object.) Having selected it, I could change the *J* in any way—resize it, move it, color it, or delete it altogether.

Our test document also required that a program import several .TIF files, which are black-and-white images of photographic quality. *Legend*, however, can neither display nor print these images at an acceptable resolution. Apparently *Legend* imports the files and then converts each image to a native format of 150 dpi. Checking the document's subdirectory revealed that the file extensions changed from .TIF to .PIC. Simply looking at the printed output revealed that there are major problems with *Legend's* ability to handle high-resolution bit-mapped images.

**THE GOOD NEWS** *Legend's* performance improves considerably when graphics are out of the picture. Although still much slower than *Ventura*, *Legend* picked up speed when creating our 100-page, text-only document. The ASCII file that I imported into *Legend* required me to make one minor change—to include an "@" symbol in the embedded formatting command. It then took about 5½ minutes to create a totally typeset document.

Importing the file was the least significant part of the process. *Legend* read the ASCII file very quickly. But because *Legend* does not have automatic page flow, you must go through the extra step of updating the end of your document. This command, which is found in the Chapter menu, took over 2 minutes to execute.

The final step of this process requires that you save and then open the document. *Legend* understands the embedded format



*Legend's* text-editing capability is its best feature. Here a dialog box allows you to set the parameters for a text search-and-replace. The search can be made case sensitive, and it allows for replacement verification on a case-by-case basis.

Item	New York	Tokyo	Hong Kong	Seoul	Singapore
Deluxe hotel room	\$160.00	\$290.00	\$130.00	\$140.00	\$120.00
Full hotel breakfast	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00
English electric fans	\$45.00	\$120.00	\$25.00	\$10.00	\$20.00
Showerhead valves	\$1.25	\$1.00	\$1.00	\$1.00	\$1.00
Curtain mesh (M-22)	\$1.00.00	\$1.25.00	\$1.00.00	\$1.10.00	\$1.10.00
Large silk scarf	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00

This table was a snap to create with *Legend*. *Legend* imports .DIF files and allows you to control the type specifications for each individual row or column. You can also access a menu through which you can control column widths or create headings that straddle columns.

# Mother Nature Can Teach Us A Lot About Hard Disks.

It can happen with no warning. The sky goes dark and then it's there. A whirling funnel that destroys everything in its path, leaving little or nothing that can be retrieved. Just the way that disaster can strike your hard disk, scattering your data to the wind.

Virtually nothing is safe from a tornado, but fortunately there is a way to protect your hard disk data from a crash.

It's called FASTBACK PLUS. And though you can find cheaper programs, you won't find a better one, at any price.

With FASTBACK PLUS, daily incremental backups can take as little as a minute a day. In fact, backing up a full 10 megabytes on your hard disk takes only about 4 minutes.\* And that makes FASTBACK PLUS the world's fastest backup program.

And now, with version 2.0, there are more features than ever. While supporting DOS 3½ or 5¼ inch floppies, it simultaneously reads your hard disk as it writes data to floppies, tape, cartridges or any other logical DOS device. With data compression, it cuts the number of backup disks in half. Plus, there's a unique "restore estimate" feature that tells you what disks to use, and warns you if there isn't enough room left on your hard disk. And version 2.0 is easier than ever to use. So easy, and so fast, you actually *will* use it. Every day. And that's the whole point. But you don't have a minute to lose. Your hard disk may be brewing up a storm right now. Protect it with FASTBACK PLUS, before it's too late.

## A Minute A Day Keeps Disaster Away



\*With H, XT or equivalent  
XT machines even take longer

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Baton Rouge, LA 70809  
(800) 873-4384, (504) 291-7221

Edward R. Degeenger Bruce Coleman Inc.-NY

This product is in no way associated with or has origination in Fisher Scientific or Allied Corporation.

CIRCLE 286 ON READER SERVICE CARD

# NEW MOUSE FOR OLD

IF YOU RUB THIS LAMP,  
A GENIE WON'T APPEAR,  
BUT YOU'LL APPEAR TO BE A GENIUS BY  
TRADING YOUR OLD MOUSE\*  
FOR THE NEW, HIGH RESOLUTION



## Genius Dyna Mouse GM-6000

**Dynamic  
Resolution  
350-1050  
DPI**

This convenient and practical mouse, enhances your productivity by giving you flexible control.

**THE GENIUS DECISION** Over 1,000,000 users have made the Genius Decision and more keep joining in. Now KYE has developed another exciting step in mouse evolution. Now YOU should make the Genius Decision!

**DYNAMIC RESOLUTION** The High Resolution Genius Dyna Mouse's cursor control is not only based on the travel count, but also the speed of the mouse's movement. The dynamic resolution can go from 350 to over 1050 DPI, or you can set the resolution as low as 90, 120, or 175 DPI if your application requires it.



**2 IN 1 MOUSE** Switch select either 2-button (Microsoft Mouse) or 3-button (PC Mouse) mode, easily and quickly.

**INCLUDES:**

- GM-6000 Mouse (Serial Mouse)
- Dr. Halo III Software
- Genius Menu Maker Software
- Genius Menu Library
- Three User Manuals
- Genius Mouse Pocket
- Genius Mouse Pad
- 9 to 25 Pin Adapter

**Suggested Retail \$109.00**  
The most powerful and versatile mouse ever!



**\*TRADE IN OFFER:** Send in your old Mouse (any species) and receive \$40.00 off on the new Dynamic High Resolution Genius Dyna Mouse GM-6000. Send only the mouse, with a check or money order for \$69.00 plus \$3.00 for shipping and handling, or your Mastercard or Visa number and expiration date, and we will ship you ALL NEW Genius Dyna Mouse package. (This offer is for end users. Only ONE mouse per customer please. Limited time only.)

## ANOTHER GREAT PARTNER FOR DESKTOP PUBLISHING WHEN YOU CHOOSE ONLY THE BEST

## Geni Scan GS-2000



This convenient hand scanner allows you to input images and documents into computer files with no distortion.

### INCLUDES:

- GS-2000 Scanner and Controller
- Genius ScanEdit Software
- Dr. Halo III Software

### FEATURES:

- OCR Format Supported
- Extensive Support for Image Formats
- Image Editing
- Multi-window Scanning
- True to Size Image Printing
- Read Width 105mm

Works with Aldus PageMaker, Dr. Halo, FrontPage, GEM, Microsoft Windows, OCR Systems ReadRight, PC Paintbrush, Ventura Publisher, WordPerfect, and others.

**Suggested Retail \$279.00**

**LIFETIME WARRANTY** on all Genius products.

- **24 hours BBS** Electronic Bulletin Board System gives you the most updated information anytime.

- **Toll free Technical Support** Knowledgeable technicians stand by to answer your questions regarding our product.



### KYE INTERNATIONAL CORP.

159 PINEFALLS AVENUE, WALKER, CA 91789  
TEL (714) 594-9234 BBS (714) 594-7557 Support (800) 456-757E  
EAST COAST (910) 854-5047

- Payment: Visa, MasterCard or C.O.D. Cashier Check
- All brand of product names are trademarks or registered trademarks of their respective holders.



## High-End Desktop Publishing Software: Summary of Features

(Products listed in ascending price order)

	The Office Publisher \$495	Legend \$695	PC PageMaker \$795	PC Ventura Publisher \$895
<b>PAGE LAYOUT FEATURES</b>				
Maximum number of columns	99	32	20	8
Allows unequal column widths	●	●	●	●
Adjusts text if column change	●	●	●	●
Automatic text flow	●	●	●	●
Stores text overflow	●	●	●	●
Inserts and removes pages	●	●	●	●
Rearranges page sequences	●	●	○	●
Headers and footers	●	●	○	●
Automatic page numbering	●	●	●	●
Automatic index generation	●	●	○	●
Automatic table-of-contents generation	●	●	○	●
Automatic footnoting	○	●	○	●
Automatic figure numbering	○	○	○	●
Automatic widow and orphan control	●	●	○	●
On-screen rulers	●	●	○	●
Shows cursor position on ruler	●	○	○	●
Shows cursor coordinates	○	○	○	●
Shows size of a selected graphic	●	●	○	●
Stores onscreen text and graphics	○	●	●	●
<b>TEXT FEATURES</b>				
<b>Text formatting</b>				
Links page layout to text files	●	●	○	●
Automatic numbering of charts and tables	○	○	○	●
Has style sheets	●	●	●	●
Uses dictionary hyphenation	●	○	●	●
Uses hyphenation logic	●	○	○	●
Hyphenates foreign languages	●	○	○	●
Has kerning tables	○	●	●	●
Allows editing of kerning tables	○	○	○	●
Allows manual kerning of display type	●	●	●	●
Allows manual kerning of individual lines	●	●	●	●
Allows manual kerning of individual words	●	●	●	●
Increments by leading	●	●	●	●
Tab leaders	●	●	●	●
Tab leaders (.....)	●	●	●	●
Superscripts and subscripts	●	●	●	●
Reverse type	●	●	●	●

PC — Indicates Editor's Choice ● — Yes ○ — No

(continues)

codes only after reopening the file. But even with all this extra manipulation, *Legend* outperformed *The Office Publisher*.

*Legend* boasts of the speed at which you can enter and edit text. While it does take a few seconds to switch from graphics to text mode, and although there is a slight delay for the first character to appear, you can really type quickly without outrunning the buffer.

The program also contains several effective text-editing tools. I really liked *Legend's* ability to perform a text search-and-replace. It allows you to check only the text that is in the current frame or to follow an entire story through in sequence. The search can be case sensitive or insensitive, and it can leave unchanged the case that is already present (a nice touch for words that begin sentences).

Other menu choices allow you to spell-check a document or to change the emphasis on a word, making it bold or uppercase. These are precisely the kind of features that support NBI's claim of word processing functionality within a desktop publishing environment.

*Legend's* table-creation and editing functions also worked flawlessly. It imports .DIF files and, with unusual common sense, assigns tabs to each cell as it reads in the data by column or row. You can tab through the chart and change information, or you can designate different type styles for specific ranges. Controls for col-



## FACT FILE

*Legend*, Version 1.1  
NBI Inc.  
3450 Mitchell Lane  
Boulder, CO 80301  
(800) 922-8828  
List Price: \$695

Requires: 640K RAM  
(2MB recommended),  
hard disk, Microsoft Windows 2.03 or later,  
80286 processor, DOS 3.1 or later.  
In Short: Good text-editing features cannot  
compensate for *Legend's* slow and erratic  
performance with graphics files. After work-  
ing with the program to produce our four-  
page newsletter, we suspect that what be-  
comes this *Legend* must be waiting for  
Version 2.0. Not copy protected.

CIRCLE 68 ON READER SERVICE CARD





## ■ DESKTOP PUBLISHING

umn widths, or straddle headers, are available from a special menu that pops up when you are in table-editing mode.

**MENU MANIA** *Legend* has a table-editing mode, a text-editing mode, a graphics-editing mode, and a frame-editing mode. And if the menus were structured as logically as my sentence, I would be very happy. But unfortunately the menus display anything but common sense.

The table-editing menu, for example, appears only when you left-click on a frame that has been designated as a table frame. Left clicks are reserved for editing the contents of a frame, and right clicks for editing the frames themselves. Therefore, right-clicking on the same frame removes the table menu from sight and allows you to access the frame-editing menu—which follows the more standard convention of graying out the menu choices when you are in another mode.

This kind of inconsistency in the menu structure is confusing and makes learning the program difficult. For example, when you want to create a type style you choose *Style>Create*. When you want to use a type style, you choose *Style>Use*. But the equivalent functions for frames do not have a parallel command structure. To create a style for a frame, you choose *Frame>Create Props*. To use a frame you choose *Frame>Create*. It sounds illogical because it is illogical.

*Legend* relies heavily on style sheets to provide control over frame and text elements. In a document that requires a number of different treatments, you can soon find yourself lost in a maze of complicated dialog boxes. I appreciate the fact that you can change a style locally or globally; I don't appreciate the fact that you must access local styles in two disparate ways, depending on whether you need a frame or a text style.

In fairness, NBI is currently working on a maintenance update of *Legend* (Version 1.2) that will address some of these problems. I hope NBI takes the opportunity to simplify and standardize the menu. I can see the benefits of showing the drawing tools only when the user is in graphics-editing mode—that's fine. But then consistency demands that the text-editing functions appear only when the user is in



## High-End Desktop Publishing Software: Summary of Features

(Products listed in ascending price order)

	The Office Publisher \$495	Legend \$695	PageMaker \$795	Venture Publisher \$895
<b>TEXT FEATURES</b>				
<b>Text manipulation</b>				
Combined horizontal and vertical text	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
45-degree rotation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Infinite rotation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Mixed horizontal, vertical, and rotated text on the same page	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Text merged from several files	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Text editing</b>				
Edits text globally (search-and-replace)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Changes type specs globally	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Changes paragraph form globally	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Has undo command	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Text import</b>				
ASCII	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
DCA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GEM Write	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Microsoft Word	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Text import</b>				
MultiMate	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Windows Write	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
WordPerfect	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
WordStar	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Formatted text import</b>				
DCA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GEM Write	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Formatted text import</b>				
Microsoft Word	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
MultiMate	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Windows Write	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
WordPerfect	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Formatted text import</b>				
WordStar	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Xerox Writer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
XyWrite	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

—Indicates Editor's Choice ●—Yes ○—No

(continued)

*a Stroke  
of Genius...*

## The Orchid ProDesigner.™

Dip your brushes into the Orchid palette to create picture-perfect images.

With 256 high resolution colors, nine extended modes, and a 16-bit bus, the Orchid ProDesigner series brings your creations to life at lightning speed. The product line is register-level compatible, upgradeable, and affordable. Whether you're using desktop publishing, CAD/CAM or business applications, you'll see brilliant designs from a colorful perspective. The ProDesigner series lets you accent your work with vivid graphics.

Installation is a snap. ProDesigner automatically configures to your monitor and 8 or 16-bit bus. And because you use more than one application, ProDesigner ingeniously selects the correct mode on its own. So you can concentrate on unleashing your genius into the creative world of Orchid graphics.

ProDesigner, Designer 800 and Orchid are trademarks of Orchid Technology. IBM, VGA, MCGA, EGA, CGA, and MDA are trademarks of International Business Machines. All other products are the trademarks of their respective manufacturers.

Features	ProDesigner VGA Plus	ProDesigner VGA	Designer 800 VGA
Bus & BIOS Support	16 and 8 Bit	16 and 8 Bit	8 Bit
Extended VGA Modes			
360x480 256 colors	Yes	Yes	Yes
640x350 256 colors	Yes	With User Upgrade	With User Upgrade
640x480 256 colors	Yes	With User Upgrade	With User Upgrade
800x600 16 colors*	Yes	Yes	Yes
800x800 256 colors*	Yes	With User Upgrade	With User Upgrade
1024x768 16 colors*	Yes	With User Upgrade	No
3 - 132 columns 16 color modes	Yes	Yes	Yes
100% Register and BIOS Compatible with VGA, MCGA, EGA, CGA, MDA and Hercules	Yes	Yes	Yes
Auto Mode Switch, Auto R/16 Bus Sense and Auto Monitor Select	Yes	Yes	No
Suggested Retail Price	\$599	\$499	\$399

\* Supports these standards on both interlaced (IBM 8514 and compatibles) and non-interlaced (NEC Malaysia XL and compatibles) monitors.

ORCHID TECHNOLOGY  
45365 Northport Loop West  
Fremont, CA 94538  
Tel: (415) 683-0300

ORCHID (EUROPE) LTD.  
Basingstoke, U.K.  
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## DESKTOP PUBLISHING



### High-End Desktop Publishing Software: Summary of Features

(Products listed in ascending price order)

	The Office Publisher \$495	Legend \$695	PC PageMaker \$795	PC Ventura Publisher \$895
<b>GRAPHICS FEATURES</b>				
<b>Graphics import</b>				
.CGM files	○	○	●	●
.CUT files	●	○	●	●
.DBF files	○	○	●	●
.GDI Metafiles	○	○	●	●
.IMA files	●	○	●	○
.PIC files	●	●	●	●
.RIO files	○	○	○	○
.SCODL files	○	○	○	○
.TIF files	●	●	●	●
.TIPS files	○	○	○	○
.WK1 files	○	○	●	●
.XLF files	○	○	○	●
AutoCAD (.DXF)	○	○	●	●
AutoCAD (.SLD)	○	○	●	●
Encapsulated PostScript (.EPS)	○	○	●	●
GEM Draw	○	○	○	●
GEM Graph	●	○	○	●
GEM Paint	○	○	○	●
Halo DPE	●	○	●	●
HPGL	●	●	●	●
In-a-Vision	○	○	●	●
Macintosh (.PICT)	●	○	○	●
MacPaint	●	●	○	●
Mentor Graphics	○	○	○	●
PC Paint	●	●	●	○
PC Paintbrush	●	○	●	●
Publisher's Paintbrush (.DCX)	○	○	●	●
Publisher's Paintbrush (.PCX)	●	○	●	●
Video Show	●	○	●	●
Windows Paint	●	●	●	●
Scanned images	●	●	●	●
Targa file format	○	○	○	○
<b>Built-in graphics elements</b>				
Reverse rules (white lines)	●	●	●	●
Rectangles	○	●	●	●
Rounded corners	○	○	●	●
Circles and ovals	○	○	●	●
Polygons	●	○	○	○
Number of fill patterns	9	34	8	Unlimited
Freehand-drawing options	○	○	○	○

PC indicates Editor's Choice ● Yes ○ No

(continues)

text-editing mode. The dialog boxes—which take up nearly the whole screen—should contain more-helpful information that would clue the user in to the ways the program functions.

Another major improvement scheduled for Version 1.2 gives the user control over the frequency of the screen redraw; at the moment, you must suffer through frequent and slow screen rewrites. NBI is also planning to incorporate networking features into a future version of the product.

**SOME UNSOLICITED ADVICE** This program needs a lot more than a simple upgrade—it needs a major overhaul. First and foremost, *Legend* should work consistently within the *Windows* environment. No one could feel comfortable working with a program that delivers several error messages a day.

In addition, *Legend* should import more file formats—and do it with more tolerance of the nuances inherent in writing complex data structures. On my list of files that *Legend* should import directly are .EPS (Encapsulated PostScript), .WK1 (*Lotus 1-2-3* worksheets), and .DBF (*dBASE* files).

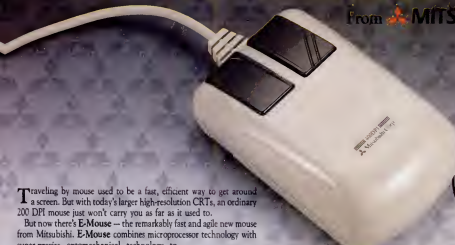
I assumed that *Legend* could currently read .DBF files, an understandable mistake since the Mailmerge menu choice allows you to pick *dBASE* files as an option. But I discovered that *Legend* then looks for a file with a .TXT extension. NBI explained this inconsistency by saying that *Legend* doesn't actually read real *dBASE* files; instead, you must copy all of the selected fields from your database to a character-delimited ASCII file.

If I were to give NBI one piece of advice, it would be to emphasize the text-handling features of this product. The newly coined phrase "document processing" ought to be something more than marketing hype; this is a concept that should inform the design of the product. Creating closer ties with other business applications, like *Lotus 1-2-3* or *dBASE*, would push the document-processor metaphor that much further, and would distinguish this product from the competition by making it truly useful.

In its current state, *Legend* flip-flops between the two worlds of word processing and desktop publishing. Without mak-

# WHY SETTLE FOR A MICKEY OR A MINNIE WHEN YOU CAN HAVE A MIGHT "E-MOUSE"™

From  MITSUBISHI



The Only  
400 DPI  
Serial Mouse  
Available!

Traveling by mouse used to be a fast, efficient way to get around a screen. But with today's larger high-resolution CRTs, an ordinary 200 DPI mouse just won't carry you as far as it used to.

But now there's **E-Mouse** — the remarkably fast and agile new mouse from Mitsubishi. **E-Mouse** combines microprocessor technology with super-precise optomechanical technology to achieve the highest possible resolution ever in a serial mouse — 400 DPI. And **E-Mouse** offers you a variety of other performance-enhancing features as well. For example:

- With a maximum tracking speed of 10 inches per second, **E-Mouse** moves across the screen with more than twice the efficiency of other mouse devices.
- You can connect it directly to your PC's serial port without opening your machine and using valuable expansion slots. Just plug it in and go!
- **E-Mouse**'s "Fit-in-Palm" design maximizes comfort and minimizes fatigue... for hours of easy operation.

**E-Mouse** is completely MicroSoft® compatible, too. Its 15 pop-up menus allow you to control cursor movements in applications that do not usually support mouse devices.

Yet with all of this, **E-Mouse** is affordably priced at only \$179.95. In fact, call Mitsubishi at 1-800-232-5727 before April 30, 1989 and you'll also get **Drafix/CAD™** — the fast, easy-to-learn, full-featured CAD system (a \$295 value) — for an additional \$69.95!

Call now. And see why this mouse is rapidly becoming the big cheese.

Product	Resolution	Occupation of Slots	Mouse Driven and Utilities	Menu Generator	No. of Pre-Defined Pop-Up Menus
Mitsubishi E-Mouse™	400	No	Provided	Provided (simple procedure)	15 ready to use
Logitech HAZE™	320	Yes	Provided	Provided (complex procedure)	15 must be compiled
MicroSoft Mouse™	200	Yes, when used as bus	Provided	Provided (complex procedure)	3 ready to use



The most comfortable mouse on the market. Yet so durable its buttons are designed and tested to withstand more than 1 million cycles.

To order, call toll-free:

**1-800-232-5727**

(Dealer inquiries welcome, too — call (212) 605-2607)

CIRCLE 110 ON READER SERVICE CARD

Mitsubishi International Corporation/

Hi-Tech Components & Plastics Company

520 Madison Avenue, New York, NY 10022

(212) 605-2607, 605-2411



## ■ DESKTOP PUBLISHING

ing a commitment to true excellence in either application, *Legend* is really neither here nor there.—Luisa Simone

### The Office Publisher

Four-page newsletter  
Long document,  
mostly text  
Three-fold brochure,  
heavy graphics  
Four-color report or  
small magazine



The high end of the PC desktop publishing market has traditionally been a two-horse race between *Ventura Publisher* and *PageMaker*, but lately a number of products have been trying to increase the size of the field. *The Office Publisher*, a \$495 entry from Laser Friendly, has inspired a great deal of interest and curiosity in its attempts to overtake the front-runners.

Like *Ventura*, *The Office Publisher* runs under Digital Research's GEM operating environment, and like *Ventura*, it relies heavily on style sheets, frames, and "tagged" text for governing the formatting of the pages it produces. Here the similarities end as *The Office Publisher* follows its own course to the printed page.

**LET'S PLAY TAG** One unique and powerful concept that affects all the work you do in *The Office Publisher* is the way style tags are defined and used. In most products, style tags stand alone; their text is essentially unaffected by surrounding text or tags, and any text element can only be assigned a single tag.

*The Office Publisher* works differently. Instead of thinking of tags as a solid color that you brush over text, you can envision *The Office Publisher* tags as clear overlays. Thus, one tag might be assigned to an entire article or a large block of text, with other tags laid on top of smaller sections of that larger block. This means you can define a tag called "indented" that would cause a section to be printed in italics, with



## High-End Desktop Publishing Software: Summary of Features

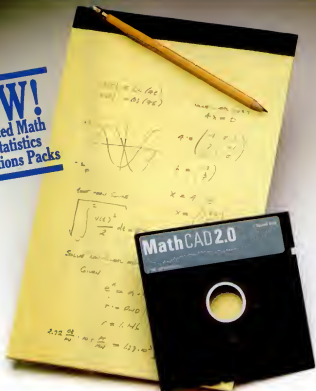
(Products listed in ascending price order)

	The Office Publisher \$495	Legend \$695	PC PageMaker \$795	PC Ventura Publisher \$895
<b>GRAPHICS FEATURES</b>				
Graphics manipulation				
Scaling	○	●	●	●
Cropping	●	●	●	●
Rotation	●	○	○	●
Undo	○	●	●	○
<b>PRINTERS SUPPORTED</b>				
<b>Laser printers</b>				
AST TurboLaser	●	●	●	●
Canon LBP-8A1 and LBP-8A2	●	○	○	●
Cordata	●	○	○	●
HP LaserJet and compatibles	●	●	●	●
Interpress printers	○	○	○	●
Ricoh PC Laser 6000	●	●	●	○
<b>PostScript laser printers</b>				
Apple LaserWriter	●	●	●	●
IBM 4216 Personal Pageprinter	●	●	●	●
Other PostScript printers	●	●	●	●
<b>PostScript features:</b>				
Windows PostScript driver	○	●	●	●
Proprietary PostScript driver	●	○	○	●
Maximum dot resolution	●	●	●	●
<b>Laser printer controller board</b>				
Tell Tree J-Laser	○	●	●	●
<b>Color ink jet printers</b>				
Diablo C150 color ink jet	●	○	○	○
HP ThinkJet	●	●	●	○
IBM Color Jetprinter	●	●	●	○
Quadram Quadjet 9000	○	○	○	○
Xerox Model 4020	○	●	●	○
Other color ink jet printers	None	AMT Office Printer QMS ColorScript	AMT Office Printer QMS ColorScript	None
<b>Dot matrix printers</b>				
Apple ImageWriter	●	○	○	○
Epson FX series	●	●	●	●
Epson LQ series	●	●	●	●
IBM Proprinter	●	●	●	●
Other dot matrix printers	GEM-supported	DEC, Wang	DEC, Wang	NEC Pinnerick, Toshiba
<b>Other devices</b>				
Diablo 530 daisy wheel printer	○	○	○	○
Plotters	●	○	○	○
Polaroid Palette film recorder	○	○	○	○
Other film recorders	Electro compacolor, IBM Model 4250	Matrix, VideoShow	Matrix, VideoShow	None

PC—Indicates Editor's Choice ●—Yes ○—No

(and)

**NEW!**  
Advanced Math  
and Statistics  
Applications Packs



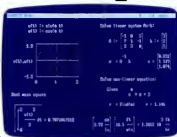
# Your pad or ours?

If you perform calculations, the answer is obvious.

MathCAD 2.0. It's everything you appreciate about working on a scratchpad—simple, free-form math—and more. More speed. More accuracy. More flexibility.

Just define your variables and enter your formulas anywhere on the screen. MathCAD formats your equations as they're typed. Instantly calculates the results. And displays them exactly as you're used to seeing them—in real math notation, as numbers, tables or graphs.

MathCAD is more than an equation solver. Like a scratchpad, it allows you to add



text anywhere to support your work, and see and record every step. You can try an unlimited number of what-ifs. And print your entire calculation as an integrated document that anyone can understand.

Plus, MathCAD is loaded with powerful

built-in features. In addition to the usual trigonometric and exponential functions, it includes built-in statistical functions, cubic splines, Fourier transforms, and more. It also handles complex numbers and unit conversions in a completely transparent way.

Yet, MathCAD is so easy to learn, you'll be using its full power an hour after you begin.

What more could you ask for? How about two new applications packs to increase your productivity?

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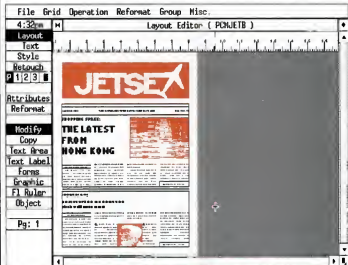


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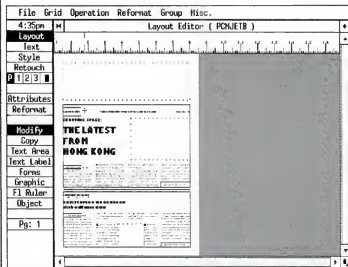
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## DESKTOP PUBLISHING



The main screen in *The Office Publisher* offers a variety of magnifications, including the full-page view shown here. The default color for the display of graphics elements is red, although that can be customized. The program in this screen is in the Layout mode, in which you create and modify text and graphics frames.



This full-page view of the first page of the test newsletter has the graphics "hidden" so that *The Office Publisher* can refresh the screen faster. Note that the page has not been correctly repainted during the last refresh; the horizontal rules next to the + -shaped cursor extend only part of the way across the page.

single-line spacing and an extra half-inch margin to the left and right.

The advantage of this approach is that the text then takes all its other attributes from the broader tag, such as font size and typestyle, margins, and line spacing. The "indented" tag can be reused with a different article that has a different typestyle, and the text will appear in the same style as the rest of the article—with the appropriate modifications. The basic concept is that the tags can be nested, and any attribute not specified by the innermost tag will be governed by a surrounding tag.

As with any powerful feature, this tag design runs the risk of becoming unwieldy. When you call up the tag definition function, you are confronted with not one but eight separate screens, covering typestyle, line attributes, paragraph features, columns, tags, and much, much more. Of course, you change only the specific items that you need to adjust for that tag, but there's a temptation to change more than you need to, and this can lead to unexpected and undesired results. When a chunk of text comes out wrong, you may have to search through all the tags that affect that area of text to see which one contains the offending specifications.

*The Office Publisher* does what it can to help you find the tags, with a number of menu choices to search forward and back for the different embedded tags. Unfortunately, I still had a great deal of difficulty in marking blocks of text so that I started beyond one tag but before another. I frequently got an error message saying that the block started inside one tagged area but ended outside of it, and questioning how I wanted to resolve the problem. *The Office Publisher* offers an option to display the location of the tag markers, which helps a little, but it does not solve the problems completely.

Another problem with *The Office Publisher's* tags is that they offer almost too much control. For example, I saw that the styles could specify the number of columns—including unbalanced columns, as were used at the top of the two inside pages in the test newsletter created for this review. I went ahead and used the style tags to define my columns, only to find that this led to innumerable complications with flowing text. As a result, I had to redefine

## ■ DESKTOP PUBLISHING

the entire newsletter and use the frame attributes to specify the number of columns. (Since the frames handle only evenly spaced columns, I ended up using the style columns on the top of the two inside pages after all.)

**SPEED LIMITS** Not all my problems centered on the tags. I initially tried to run the program on a 4.77-MHz XT, which is listed as a supported configuration in the documentation. The program's performance on this system was so excruciatingly slow I soon gave up; Laser Friendly recommends that you use at least an 8-MHz AT, but I suggest that an AT should be the required minimum configuration.

Even on a 20-MHz 386 machine, there are some aspects of the program that take inordinate amounts of time. For example, the program files come in a packed format on 12 disks. Unlike *Ventura Publisher*, which has many disks but uses only some, *The Office Publisher* requires that you use every disk in the stack. (This assumes that you want all the PostScript fonts and the sample templates, which is not an unreasonable assumption.) Even on this fast, state-of-the-art machine, installation took more than an hour.

The timings for the project tests were all done on an 8-MHz AT, and a glance at the results will show that *The Office Publisher* is slow compared with its competition. All files must be converted separately before you can read text into a document, and it took more than 17 minutes to convert and bring in the 100-page *XyWrite* file. It took nearly another 20 minutes to jump to the 100th page.

*The Office Publisher* has other limitations as well. It can import only six different paint-type graphics formats, and the files must have the proper extension in order to be recognized. It cannot import object-oriented images of any sort, which is a major shortcoming.

*The Office Publisher* does have some nice graphics features, including the ability to edit images on a pixel-by-pixel basis through the Retouch editor, and it does offer some simple graphic objects like lines and boxes. Overall, however, the graphic limitations outweigh these strengths.

Once you have bit-image graphics converted to the *Office Publisher* format, it is

**FACT FILE**

*The Office Publisher*, Version 1.1  
Laser Friendly Inc.  
156 Shorting Rd.  
Scarborough, Ontario  
Canada M1S 3S6  
(416) 291-3736  
List Price: \$495 (\$695 Canadian)



**Requires:** 640K RAM, hard disk, graphics display, DOS 2.1 or later; 80286 or 80386 processor and mouse recommended.

**In Short:** *The Office Publisher* has some interesting and useful design concepts, but it is flawed in its execution. The combination of awkward limitations and unreliable performance make it a distant also-ran in the race for the lead in MS-DOS desktop publishing. Not copy protected.

OFFICE 600 ON READER SERVICE CARD

easy to bring the picture into a frame, but there is no facility that permits you to maintain the original image's aspect ratio. Your only hope is to use the image-cropping facility (where changes are measured in pixels) to approximate the correct size and shape.

The program makes poor use of the HP LaserJet, requiring you to make your own installation of fonts. It does provide canned support for many HP font cartridges, but it fails to support the popular and useful Z-cartridge. If you do install the program for the LaserJet, you will find that the tutorial is nearly impossible to run since it was designed to make extensive use of a PostScript printer's features. (The tech support person I spoke with at Laser Friendly suggested that I reinstall the program for a PostScript printer and do all the tutorial exercises without actually printing anything, then reinstall for the LaserJet.)

If you do install for a PostScript device, you may have difficulty using other PostScript font outlines. *The Office Publisher* comes with a bunch of definitions from the Compugraphic Intellifont collection, which it can use to generate soft fonts. You cannot use the Adobe PostScript fonts without first creating a multipage PostScript program to direct the importation (directions come in a 20-page document from Laser Friendly tech support).

**WARNING MESSAGES** Once you start to use *The Office Publisher*, you will probably see frequent warning messages signaling minor transgressions that may or may not affect the final printed outcome. Laser Friendly has built in a solution to this, which I found remarkable. They even suggest that you put this feature to use while in the third lesson of the tutorial:

"If you receive a warning at this stage, click on OK. Then pull down the Misc menu, select Preferences, click on General, and change the Warnings setting to No. Then click on OK. This will suppress the display of warnings, and thus speed up your work."

It seems strange that the program provides these messages as a means of warning you about mistakes, and then the publisher suggests that you ignore them.

The biggest problem with *The Office Publisher* is all its rough edges. This is not a brand-new product; this is Version 1.1, a new release of an existing product. As a result, we should be able to expect a mature program that may have a few small flaws here and there but is free from major defects.

If only this were the case! *The Office Publisher* crashed not once but twice while I was trying to create the sample newsletter for the PC Labs test procedures. When it crashes, *The Office Publisher* has the good grace to warn you that something bad has happened and that you should try to salvage whatever you can from the temporary files, but you soon find yourself gazing numbly at the DOS prompt. The first time, I tried to recover from the temporary files, but *The Office Publisher* later decided to expand the style tag file to 6.5MB of superfluous bytes while I was working with the recovered files. At that point, I decided to start from scratch and resolved to save early and often.

There are other small flaws that seem larger in the light of unreliable performance. On screen refreshes, some inverted blocks of text do not get restored properly, producing a harlequin effect on a screen that is already cluttered. When I was printing part of a headline with inverted text on a QMS PostScript printer, a heavy line appeared under the second line of the headline on the output; this line disappeared if I removed the inverted tag or

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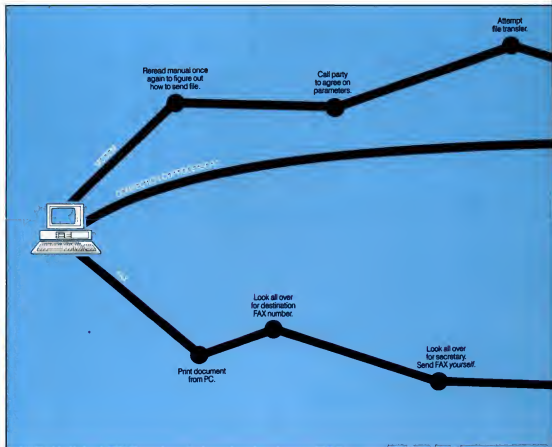
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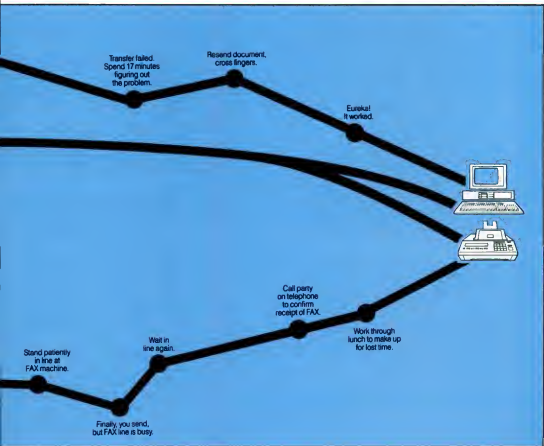
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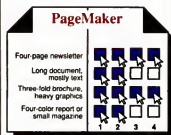
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## ■ DESKTOP PUBLISHING

changed the inverted type size.

They say it is a difference of opinions that makes horse races, and the same adage holds for PC software. In the race for the best PC-based desktop publishing program, take this handicapper's advice and don't put your money on this horse yet.—Alfred Poor



Aldus Corp.'s *PageMaker* for the Macintosh created the desktop publishing marketplace. Its compositional power, linked with the printing power of the Apple LaserWriter and the graphical environment for the Mac, created a natural environment for desktop publishing to grow. *PageMaker* for the PC was introduced one step behind the Mac version and has always lagged behind in features and functionality. In fact, the PC version of *PageMaker* was the very reason not to buy an IBM-based desktop publishing system. Until now.

*PC Magazine* has never reviewed Version 2.0 of *PageMaker*, but that's because there never was a Version 2.0 for the PC. While simultaneously updating Mac and PC versions of *PageMaker*, Aldus seized the opportunity to cross-align version numbers to reduce confusion. This is also a sign of recognition that both the Mac and PC can and in many cases do coexist in one company where files need to be transported between platforms.

At \$795, *PageMaker* is \$300 more expensive than *The Office Publisher* but \$100 cheaper than *Ventura Publisher*. Though the new version is \$100 more expensive than Version 1.0a, registered users can upgrade to version 3.0 for \$75 plus \$15 shipping and handling. That price is

cut in half if you are an extended technical support subscriber.

**INSTALLATION** If you could never find a reason for using *Microsoft Windows*, *PageMaker* will take care of that. In fact, it's required. The master disks provided with *PageMaker* have an optional runtime version of *Windows 2.0*.

*PageMaker* is installed just like any other *Windows* application, via text input screens that lead you through a series of options, and it's a breeze. The installation software tells you when to switch disks, and when it finishes, it instructs you on what other steps you will need to take. *PageMaker*'s documentation, which helps with both installation and the regular use of the program, is some of the best around. Clearly organized, well illustrated, and logically indexed, it takes you through example after example of the product in use. The program also comes with a tutorial book that helps you to construct and edit a series of pages. In case you are doing this for the first time, sample files are included with the master disks, and they can be copied to a PMTUTOR subdirectory at installation time.

**WHAT'S NEW** Desktop publishers who use *PageMaker 1.0a* will be delighted to find that Version 3.0 offers greater flexibility in working with text. When we compared the original versions of *PageMaker* and *Ventura Publisher* (a favorite battle among DTP aficionados), *PageMaker* came up short in the long-document category. Fortunately, text auto-flow has been added to improve its long-document handling. In addition, Aldus has added a powerful set of text style controls that make it possible to create a page template, embed style tags in a text file, and pour a complete file into a document.

Auto-flow is simple in concept. A set of master pages, the template, is constructed with the number of columns defined. After a text file is read in, the first column location is chosen and all subsequent columns are filled with the remainder of the text. If your text goes beyond one page, the software automatically adds more pages to accommodate.

*PageMaker*'s new style palette expands the usefulness of auto-flow. The style pal-



## Performance Tests: High-End Desktop Publishing Software

A quick glance at the results shows the industry leaders, *PageMaker* and *Ventura Publisher*, leading the pack in most of the tests. They share first place for small file size (text only). These packages imported the *XyWrite* files directly, adding nothing to the original size of the files. *Legend* added overhead, doubling the file size, while *The Office Publisher* added its own functions to the files, quadrupling their size.

The File Size (Text and Graphics) totals identify the packages that bundle style sheets, libraries, and other files with the document. Tops in this category is *PageMaker*, which creates only one file per document. Next is *Legend*, which requires only three main components to run the document: text, graphics, and style sheets.

Note that our newsletter has a number of graphic and scanned images, so the Open a Four-Page File test gives a good indication of how long a package takes to load a complex document into memory. *PageMaker* and *Ventura* were the fastest. The same two programs, both of which have extremely efficient memory management, were the best at saving the file and turning pages within it.

*PageMaker* was slowest at printing the document for a very good reason: it is the only package we tested that actually reads entire .TIF files. The others interpret the .TIF file as some other lower-resolution format. The value of *PageMaker*'s method is proven by the clarity of its output.

Also, *PageMaker* did not have to perform additional overhead functions on a file to read it, and thus was quickest at reading in the big file. *The Office Publisher* was the only package we tested that would not read in a *XyWrite* file directly, but required an additional file-conversion step (which took 4 minutes 47 seconds, bringing the total time to 17.46).

Note the differences in test results between the first-time jumps and the average jumps, as the packages "learn" the jumps and save the last page in memory. *Ventura* was unsurpassed on all the Jump to Page 1 tests, which indicates that the program holds page 1 in memory. *PageMaker* was fastest in jumping to the end of the file, and it tied *Ventura*'s score for repeated jumps to page 1.

## FOUR-PAGE NEWSLETTER TESTS

### Performance Times

(Times given in minutes and seconds)

	File Size (Text Only)	File Size (Text and Graphics)	Open a Four-Page File	Save a Four-Page File	Turn Page	Print Document
<b>The Office Publisher</b>	63K	1,179K	0:36.3	0:26.3	0:30.5	14:58.0
<b>Legend</b>	32K	150K	1:54.3	0:39.6	0:33.6	15:34.2
<b>Ventura Publisher (with Professional Extension)</b>	15K	700K	0:19.0	0:15.0	0:02.4	6:43.0
<b>PageMaker</b>	15K	144K	0:14.9	0:02.3	0:05.5	36:27.0

### File Size (Text Only)

The size of the file containing the newsletter's text is measured (and reported in kilobytes) once it is stored in each package. In some cases, XyWrite files are not imported directly but are converted to the package's native file format; the additional overhead results in a larger file size.

### File Size (Text and Graphics)

The file size for text and graphics is derived by adding those files created specifically for the application. For example, one package may require style sheets to be defined for each document produced. General files not attached to the document (such as fonts and executable files) are not included.

### Open a Four-Page File

Timing of this test starts an entry of the command to call up the four-page test file and stops when the program finishes drawing page 1 on the screen. The test is performed three times, and the results are averaged.

### Save a Four-Page File

Before the start of this test, the four-page file is already on-screen. The test begins with the keystrokes necessary to save the file. Timing stops when the file is saved. The file is saved three times and the resulting times averaged.

### Turn Page

The test also starts with a complete document on-screen. Timing begins the moment the command to turn the page is executed and ends once the screen is completely redrawn. The test is performed three times, and the results are averaged.

### Print Document

To prepare for this test, the PostScript printer is initialized. The test begins when the file is sent to print and ends when the last page of the four-page document is printed and ejected. The test is performed three times, and an average of the results is taken.

## 100-PAGE FILE TESTS

### Performance Times

(Times given in minutes and seconds)

	Read in File	Jump to Page 100 (First Time)	Jump to Page 1 (First Time)	Jump to Page 100 (Average)	Jump to Page 1 (Average)	Jump to Page 85 (Average)	Jump to Page 1 (Average)
<b>The Office Publisher</b>	12:59.0*	19:15.0	0:10.9	0:07.2	0:05.5	0:07.2	0:05.6
<b>Legend</b>	5:22.5	2:57.1	0:06.6	0:04.6	0:03.6	1:01.7	0:05.0
<b>Ventura Publisher (with Professional Extension)</b>	1:18.0	0:35.0	0:01.0	0:35.0	0:01.0	0:30.0	0:01.0
<b>PageMaker</b>	0:03.9	0:03.9	0:05.3	0:01.0	0:01.0	0:02.0	0:01.0

\*17.46.0 including file conversion

### Read in File

This test is performed once, beginning with the command to load the file and ending when the screen is completely redrawn and cursor control is resumed. The reported time includes any overhead functions a package performs to format or frame pages and load the document into the frame.

### Jump to Page 100 (First Time)

This test begins on page 1; the keystrokes necessary to execute the command, and they stopped timing when the 100 pages. Timing stops when the screen is completely redrawn and cursor control is resumed.

### Jump to Page 1 (First Time)

Here, the document is jumped back to page 1 from page 100. Timing stops when the screen is redrawn and cursor control is resumed.

### Jump to Page 100; Jump to Page 1

This pair of tests follows the previous test: A jump from page 1 to page 100 is timed, and then a jump back to page 1. These two jumps are performed three times, and an average is taken for jumping in each direction.

### Jump to Page 85; Jump to Page 1

Now the same pair of tests is executed again, but this time the jump forward is to page 85, not page 100. This jump deflates buffering (holding the first or last page in memory), which some packages use to improve their page-jumping speeds.

PC Labs tested the four desktop publishing packages using a series of timed performance tests. The tests were conducted on a standard 5-MHz IBM PC AT with a 30MB hard disk and 640K of RAM. The tested configuration for those packages that use EMS memory (Legend, The Office Publisher, and Ventura Publisher) also included an Intel Above Board with 4MB of expanded memory. The four-page newsletter was printed on a QMS PS-810 PostScript laser printer.

All timing was done with a stopwatch. Reviewers started the clock immediately on entering the last keystroke to execute the command, and they stopped timing when processing of the command ceased. The four-page newsletter tests were performed with our newsletter, *Jetset*, as the sample document.

To test the programs' performance with very large documents, a file of 100 pages of text was created in XyWrite and used to test the speed of loading and jumping from page to page. Although standard defaults were employed (for instance, no hyphenation), most of the packages had to adjust their margin widths to make the document exactly 100 pages.



## ■ DESKTOP PUBLISHING

ette allows you to define text styles in simple English: Headline, Subhead, Text, Byline, Caption, and so on. You have complete control over these definitions: font, size, leading, capitalization, style, alignment, tabbing, and color. The definitions may be stored and used as templates or created new as you build your document.

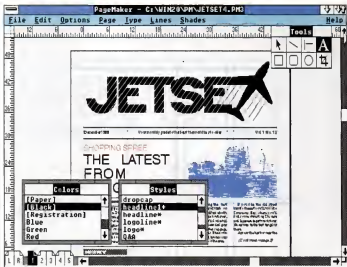
The most powerful aspect of *PageMaker*'s style palette is the ability to tag a text file in a word processor before importing it. This is a conventional typesetting process termed "coding" in which type definitions are added to a text file as codes. An extension of this concept is to macro these codes as tags. Tags are interpreted and converted into the codes necessary to drive a typesetter.

*PageMaker*'s tags act in much the same way. A tag is inserted into your text file surrounded by < > symbols. Again, the tag can be any word—caps, lowercase, or both—but it must be at the beginning of a line; no character or space may proceed the "less than" symbol. This is a notable flaw in the system's design, since it prohibits defining more than one type style per line. It can be argued that you would not want to have more than one typestyle per line, but it is likely that you would change type styles when setting up tabular material.

This is not to suggest that there is no way to change type styles in a single line. There is just no way to do it automatically with tag styles.

If there is any confusion about what a *PageMaker* style sheet is, fear not. The program comes with several ready-made style sheets that cover everything from newsletters to desk calendars. These style sheets may be altered and saved with your own name, or style sheets may be written from scratch. *PageMaker* style sheets carry the .PT3 extension, while *PageMaker* 3.0 publication files use .PM3.

A sophisticated feature of any electronic publishing system is irregular text wrapping. *PageMaker* 3.0 offers an incredibly flexible text-wrap feature. Any object can have text wrap: a rule, box, photo, graphic, anything. When you choose the text-wrap option, a static wrap area is displayed. This area can then be manipulated, pushed or pulled, to create an irregular shape.



*PageMaker*'s new features include color control. In this newsletter, typography and graphics are being displayed in color, and they could be printed in color as well. While *PageMaker* does not offer support for color separation, it does have the ability to print spot color overlays.



Of all of *PageMaker*'s new Version 3.0 features, the one that really stands out is the text-wrap function. This front-page image from the test newsletter has text wrapped irregularly around it, and the shape of the wrap is completely editable by inserting and moving wrap points with the mouse-controlled pointer.

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## ■ DESKTOP PUBLISHING

A much-desired feature of desktop packages is color. Aldus has implemented a spot color function and support of popular color printers including the QMS ColorScript. Any element may be selected and colored. The number of displayable colors is limited, since the operating environment is *Windows*. *PageMaker* allows the user to edit both the name and hue of each color, making the addition of new colors simple, and an optional on-screen color palette speeds up the color selection process. There is no support for full-color photos at this time, although third-party vendors, such as Cyber Research (New Haven, Connecticut), provide effective utilities. It would be most desirable for *PageMaker* to support the CMYK (cyan, magenta, yellow, black) color model and provide four-color separated output for full-color printing. The only option for printing color from your *PageMaker* publications is to output a mask for each color and let a print shop strip the job together. It's better than conventional methods but still costly when many colors are used.

One of the most useful features of *PageMaker* 3.0 is the addition of import filters. These filters allow you to read files directly from *dBASE*, *Lotus 1-2-3*, *Symphony*, and a host of others. The *1-2-3* filter allows you to read an entire spreadsheet, or any part thereof, by entering the spreadsheet range in the standard *Lotus* style. The *dBASE* filter lets you read in the entire database and then select the fields that you want from a menu. An extra in this function is the ability to select typefaces according to the database field—great for contracting reports and tabular material.

**THE BASIC TOOLS** New features aside, *PageMaker* is basically the same. The control over text and graphics functions still operates the same way. A full range of typographic controls and the ability to add downloadable fonts, such as *Bitstream* or *Adobe* fonts, make the typeface possibilities unlimited. Most of the popular word processors are supported, complete with formatting. Among them are *Microsoft Word*, *WordPerfect*, *Windows Write*, *WordStar*, *XyWrite III Plus*, and *Samma Word*. Alternatively, any straight ASCII file may be imported.



EDITOR'S  
CHOICE

FACT FILE

*PageMaker*,  
Version 3.0  
Aldus Corp.  
411 First Avenue South  
Seattle, WA 98104  
(206) 622-5500  
List Price: \$795  
Requires: 640K RAM,  
hard disk, Microsoft Windows 2.0 or later,  
mouse, DOS 2.1 or later.



**In Short:** A well-constructed, flexible desktop publishing program that has passed the test of time while continuing to enhance its compositional features. Though *Ventura* still has a beat in the long-document-processing category, *PageMaker* has improved, and it remains the best for short documents and brochures.

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Once your words are in, there is full control over paragraph styles for indenting, placement, and tabs. Text blocks are defined through mouse control and can be moved, deleted, replaced, or stored in the *Windows* clipboard.

Within the type/paragraph menu are all the necessary controls for text kerning in both interword and interline spacing. These are settings that globally affect the copy block selected. If further kerning is required on a character-by-character basis, positive or negative kerning may be done via the keyboard. The Ctrl-Backspace key combination tightens the spacing, and Shift-Ctrl-Backspace loosens it.

Graphics import capabilities are even more complete than text importing. All of the standard graphics file formats are supported, as well as some product-specific file formats, such as *Lotus .PIC* and *Videoshow's NAPLPS .PIC* file format. *PageMaker* automatically imports any of these file formats, and if it can't recognize the type, it will prompt you to select one.

*PageMaker* 3.0 also allows direct control of scanned image contrast, brightness, and screen pattern. Through the new Image Control submenu, these contrast and brightness settings are adjusted via a sliding scale. Four image patterns are offered to allow for special effects, such as a vertical or horizontal line. This is especially useful when you don't have time to go

back to rescan your original image. While the degree of improvement is limited, the slight adjustment is often enough.

Aside from its graphics import, *PageMaker* offers a simple graphics toolbox. While in *PageMaker* you can draw boxes, circles, lines, and round-cornered boxes, in different line weights, fills, and patterns. What's missing that would help greatly is polygons and filled polygons. With this addition, simple drawings and diagrams could be rendered while in *PageMaker*.

**PRINTING OPTIONS** Although I would never recommend that anyone use a dot matrix printer with *PageMaker*, you can. In fact, since it is a *Windows*-based product, you can use any printer that *Windows* supports.

The more likely possibility is that you will use a laser printer. If you are planning typefaces that exceed the 10- to 12-point text norm, you will definitely want to use a PostScript laser printer, or an HP LaserJet Plus with downloadable fonts. The former, while more expensive, is the simplest to configure and use on a daily basis.

*PageMaker* comes with a number of interesting print options. A useful design tool is the thumbnail sketch, which is used to get a feel for the overall pacing of a publication. *PageMaker* offers a thumbnail option that prints miniature pages grouped on a single page, thereby allowing you to view many pages at one time. On the other end of the size spectrum, a tile feature will print oversize pages across multiple pages so that you can piece them together to create posters.

**FINALLY** When compared with other DTP packages or the new breed of high-end word processors, *PageMaker* is a bargain. With a \$795 price tag, it's not cheap, but it packs a lot of power into a flexible, easy-to-use DTP software package. Like the other players in this market, *PageMaker* 3.0 has publishing areas that it is most suited to accommodate. Long documents are now easier to create with *PageMaker*'s new style palette, but in the absence of any automatic footnoting, continued lines, or widow/orphan control, *PageMaker* is not the fastest or most effective program for technical documentation

## ■ DESKTOP PUBLISHING

and other long documents where text content logic is required. Its flexibility in page composition is still excellent, however, and *PageMaker* remains best at creating newsletters and brochures.

—Gerard Kunkel



**Ventura Publisher**, Version 2.0, contains features that suit the needs of designers, typesetters, professional publishers, foreign-language users, scientists and engineers, MIS managers, and even business users. This newest release offers current users over 70 reasons to upgrade, and first-time users will find few features lacking in this carefully designed product.

*Ventura* still carries a retail price of \$895 (the new *Professional Extension* is an additional \$595). The upgrade from Version 1.1 is \$100, but if you purchased Version 1.1 after August 15, 1988, your upgrade is free.

Included with Version 2.0 is a special bundle of *Fontware* from Bitstream. The PCL users (such as HP LaserJet users) in need of additional font sizes to supplement the ones included with 1.1 can justify the \$100 upgrade based upon the font acquisition alone.

Indeed, several enhancements to 2.0 may provide some users with single incentives for upgrading. For instance, many users who now print their camera-ready art can save additional money by preparing spot color overlays as well. Version 2.0 will print a separate page for every color defined. You can define up to 6 colors from a palette of 62 million using a CMYK model.

Foreign-language users will appreciate the new support for 8-bit characters (those above decimal 128). There is a separate

text-import option for files of this type, and tag names can also include the special characters.

Users who work with multiple word-processing formats can take advantage of the new Merge Text feature. Now you can combine any number of separate documents into a single file as you create a chapter. You can also use it as a rather clever document converter by reading files from *MultiMate*, *WordStar*, and *WordPerfect* into one file and then saving this file to any one of the several supported text formats, such as *Microsoft Word*.

**TYPESETTERS, REJOICE** For the typesetting crowd, a number of professional features have been added and improvements to existing features have been made. Version 2.0 eliminates the rounding that previously occurred when working with picas and fractional point settings. This provides hundredth-of-a-point precision throughout the length of the page. A time-saving text import option will automatically swap the traditional typesetting characters (em dashes and inverted quotation marks) with the standard fare output by most word processors (— and ").

Manual kerning can now be employed on a range of selected letters and words, not just a character at a time as in 1.1. Kern text through the Set Font dialog box, or hold the Shift key down while pressing the Cursor Left or Right keys. The latter is an interactive on-screen technique and makes the copy-fitting process extremely fast and flexible.

For designers and other desktop publishers requiring special effects, text rotation is now available in 90, 180, and 270 degrees. Broad-sheet printing has been improved, with several options to turn 8½-by-11-inch sheets into uniform cutouts to produce posters, tabloid layouts, and other oversized documents.

For book publishers, the already impressive features have been enhanced. By stringing chapters together in the Multi-Chapter option, auto renumbering will take place, instructing each chapter to update its counter to the previous number plus 1. This cross-chapter numbering also applies to figures and tables. When you are working with odd-size pages, custom headers and footers can be made anywhere

**EDITOR'S CHOICE**

**FACT FILE**

**Ventura Publisher, Version 2.0, and Professional Extension**  
Xerox-Ventura Software  
9745 Business Park Ave.  
San Diego, CA 92131  
(800) TEAM-XXRX

**List Price:** Ventura Publisher, \$895; Professional Extension, \$595.  
**Requires:** 640K RAM, hard disk, Microsoft Windows 2.03, DOS 2.0 or later.

**In Short:** Version 2.0 of Ventura Publisher is more jam-packed with features than ever before, and the addition of Professional Extension really makes it shine. For long-document desktop publishing, Ventura remains the champ.

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on the page. Also, page or chapter numbers can be inserted practically anywhere—in the text, in frames, and in boxed text.

New users of the program will find learning easy through several cosmetic and operational improvements. First, on-line help has been added. Most dialog boxes now include a small question-mark icon; when one is selected, a pop-up menu with related assistance appears. There are 250 such learning messages throughout the program. With so many new features, *Ventura* veterans will appreciate the help as well.

*Ventura* still includes the stock style sheets and example chapters to assist new users in producing professional-looking documents with little effort or knowledge. They can use these example files with the step-by-step learning guide that accompanies the documentation.

First-time *Ventura* users will marvel over the program's basic features, like continual auto text flow—even as text is edited; ruling lines and other nontext features that can be included in tag names; the simple ability to see tabs, returns, and line breaks while working with text; and the thoughtful manner in which *Ventura* recognizes files throughout a hard drive or network. New and old users will like the addition of both square and hollow bullets in the Special Effects menu.



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The Handy Scanner 3000 comes complete with full-featured, powerful software for scanning, editing, and merging text with your graphics. Saved scan files are compatible with almost all graphics software, including PageMaker, Ventura, WordPerfect 5.0 and many others. The package includes the scanner, interface card, the HALO DPE desktop publishing software package (worth \$195), a utility diskette and an instruction manual.

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SHOPPING SPREE  
(Continued from page 1)

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*With Ventura Publisher's Professional Extension, Lotus 1-2-3 .PRN files can be imported directly into the Table Layout feature. Here, each cell may be individually formatted with colors or shading. If necessary, you can rotate the text as well.*



*Though it operates in the GEM environment under normal conditions, Ventura Publisher, Version 2.0, can be run through the Microsoft Windows MS-DOS Executive using a .PIF file included in Ventura's utilities. In this screen, Windows/386 is being used. On the right is Ventura Publisher's main menu.*

Dialog boxes with multiple options now include a new pop-up menu system. This limits the number of options displayed at one time and may serve to reduce the intimidation of a new user faced with the overwhelming possibilities of this program.

Built into Version 2.0 is a useful utility that will print the entire contents of a style sheet. This includes all Frame, Color, Tag, and Tab settings. Version 1.1 documents and style sheets can be used in Version 2.0, although backward migration is not possible.

**FOR WINDOWS FANS** Microsoft Windows users will appreciate the further graphics support for Metafiles, and the .PIF file formats included to run *Ventura* through the MS-DOS Executive. They will also like the option of choosing GEM- or Windows-style menus. The GEM environment employs drop-down menus that appear when the cursor simply moves over the menu name. Users can now opt for the pull-down menu system employed in *Windows*.

For an additional \$595, users can purchase the new *Professional Extension*. This high-end module is installed with *Ventura* and operates as a completely integrated product. The only visible difference is a fifth mode seen just below the original four (Frame, Paragraph, Text, and Graphics).

This fifth mode, Table Edit, is *Ventura's* answer to on-screen forms design. Rectangular grids that act as individual frames are easily structured to display numeric tables, side-by-side paragraphs, or any custom-designed form, such as expense reports. The Table Edit mode is especially useful for spreadsheets. A 1-2-3 .PRN file import option will place spreadsheet data directly into a tabular grid.

Each cell in these grids can be formatted individually. This includes background color and shading as well as rotated text. Cells can be joined or split to enhance the table at any time. The ruling lines are optional around a table and within each row or column. Because the tables can be inserted within a text file, they will flow throughout a chapter as the document moves.

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## ■ DESKTOP PUBLISHING

Professional Extension include EMS (Expanded Memory Support), which allows creation of extremely large documents (up to 32MB) and increases the speed. With 1.2MB of available EMS, you can load the 130,000-word Edco hyphenation dictionary, which is also included.

Technical and scientific writers will not want to be without the dynamic WYSIWYG equation generator. Complex mathematical equations can be typed anywhere in the text by using simple commands such as  $\sqrt{x^2 + y^2}$ . The results are immediately displayed from a complete set of equation fonts included for all supported printers and screens.

Vertical-justification control is included for column balance and copy fitting, as is the ability to customize proposals or other boilerplate material where only variable updating is required, as in client or product information. There is also cross-referencing. Text can be marked so that it will automatically reflect the location of related tables, figures, or whole sections of a document.

The corporate MIS manager will take interest in the new network version of Ventura, which supports 3Com Token-Ring, Novell NetWare/S-Net, and IBM Token-Ring networks. Other networks can be adapted. Most standard network options are included as well as special proprietary features, like an alert notifying a user that a file in a chapter has been modified by someone else on the network. Read-only files include style sheets.

Network pricing mandates that each concurrent user own a full-price copy of the product. The network version is \$1,295. Professional Extension can be added to the network for \$595 per user.

**ANY PROBLEMS?** Beyond the need for lower network pricing—like discounted node packs, for instance—what's wrong with Ventura Publisher? Not very much, though we did discover that some text-attribute overrides located near wraparound frames malfunctioned. In one case, it was necessary to make a new frame just to contain a single bold character and place that frame into a text line in order to retain the attribute override, but this kind of problem only occurred when an override was posi-

### PC EDITOR'S CHOICE

- PageMaker
- Ventura Publisher

*Though you would probably love to know once and for all which desktop publishing program is better, PageMaker or Ventura Publisher, the answer is still totally dependent on your desktop publishing needs. PageMaker, Version 3.0, has edged closer to the long-document-processing capabilities that until now have been Ventura's main advantage. At the same time, Ventura, Version 2.0, has edged closer to the intricate design and layout power of PageMaker.*

*Nevertheless, this evolution has not yet made the programs indistinguishable from one another, and each retains dominance in its realm. For a four-page newsletter, use PageMaker. For a 300-page technical document, use Ventura. With its excellent \$595 Professional Extension in tow, Ventura is also aiming to capture a corner of the turf currently targeted by the immensely powerful IBM Interleaf Publisher (reviewed in this issue).*

*The Office Publisher and Legend do not yet have enough firepower to compete with the big guns. Both desktop publishers show promise, but neither one has developed a set of features or an interface that can equal those of PageMaker or Ventura.*

*As you head into the world of high-end DTP, no program will satisfy you unless you remember that software alone does not a desktop publishing system make. A fast 286 machine hooked to a font-stuffed HP LaserJet II may get you started with one of these programs, but to take complete advantage of all their power, you must consider acquiring a 386-based system and a PostScript printer.*

tioned close to an irregular wrapped frame.

An Adobe soft font was installed for our newsletter, and because it was already listed in the PostScript width table, installation took less than 10 minutes. With the downloadable font set and many graphics, our four-page newsletter took almost 7 minutes to print.

Is there room for improvement? Maybe not—this program is packed so full of features that a new user could take months to realize all its potential. Adding much more to Ventura could make it too complicated for some users to handle productively. Outside of a few basic features like irregular frames to contain graphics for better wraparounds and support for popular printing devices like the HP PaintJet, most improvements are better left for vertical-market versions of the product.

For instance, a live link to spreadsheet data from Lotus 1-2-3 and Microsoft Excel would produce a valuable product for the financial community. This type of document processor could free companies from costly typesetting; it could speed up production time, especially in a network environment, and it could reduce errors.

Or a pared-down version of the product could go after the "short-document market"—the newsletter and graphic layout audience. Ventura is already well suited for this application; it just has more features than are typically required, making it a bit unwieldy for small projects. This type of product could carry a lower price tag but include a few extra features like automatic "continued on/from page:" messages—a necessity for creating newsletters.

In its Version 2.0 incarnation, Ventura Publisher has further distinguished itself as a leader in sophisticated document processing. The program can be just as useful to those who need to improve their office correspondence as it is to those who make their living in the publishing and typesetting industries.—Tami Peterson

*Gerard Kunkel is the design director of PC Magazine. Tami Peterson is the owner of Decorum Corp., a New York firm specializing in desktop publishing project consulting. Alfred Poor is a Pennsylvania-based PC consultant and frequent contributor to PC Magazine. Luisa Simone is an executive editor of PC Magazine.*

# Introducing For 1-2-3 printouts that

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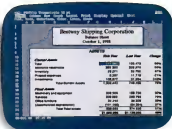
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2 Pop into Allways to make it look great

Bestway Shipping, Inc.		
October 1, 1990		
<b>Current Assets</b>		
Cash	100,000	
Accounts receivable	200,000	
Inventory	50,000	
Prepaid expenses	10,000	
Investments	50,000	
Total Current Assets		410,000
<b>Fixed Assets</b>		
Machinery and equipment	100,000	
Vehicles	50,000	
Office furniture	20,000	
(Accumulated depreciation)	(20,000)	
Total Fixed Assets		150,000
<b>LIABILITIES</b>		
<b>Current Liabilities</b>		
Accounts payable	50,000	
Notes payable	100,000	
Accrued liabilities	20,000	
Income taxes due	10,000	
Total		180,000
<b>Noncurrent Liabilities</b>		
Long-term debt	100,000	
Deferred income taxes	20,000	
Total		120,000

3 What you see in Allways is what you get on paper

# g Allways.

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### FancyFood Distributors Inc. PRICE LIST - OCTOBER, 1988

	Item #	Description	Stocking Unit	Retail Price	Dealer Price
			2'	22.50	13.50
				~ 00	15.00
					~ 97
Specialty Meats	SM-111	Longhorn Filets			
	SM-121	Georgia Country Ham			
	SM-131	Smoked Turkey			
	SM-141	Smoked Duck			
	SM-151	Yankee Loins			
	SM-161	Sausisson			
	SM-171	Blood Sausage			
Sauces	SA-111	Hollandaise			
	SA-121	Bearnaise			
	SA-131	Bordelaise			
	SA-141	Carolina Barbecue			
	SA-151	Texas Barbecue			
	SA-161	Cumberland			
	SA-171	Aloli			
Condiments	SA-181	Pesto			
	SA-191	Caribbean			
	C-111	Japanese			
	C-121	Mexican			
	C-131	Onion			
	C-141	Pineapple			
	C-151	Salsa			
	C-161				
	C-171				
	C-181				
	C-191				
	C-201				
	C-211				

ing Corporation  
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er 1, 1988

ASSETS	This Year	Last Year	Change
	247,886	126,473	96
	943,652	624,790	45
	79,071	11,718	4
	6,307	31,434	23
	128,577	21,485	
	1,308,443	748,485	

	209,806	154,730
	478,506	343,793
	80,340	36,408
	(101,090)	64,064
	298,543	274,120
	\$1,896,094	\$1,193,029

IES AND SHAREHOLDERS' EQUITY  
This Year Last Year

	428,041	232,848
	49,327	25,498
	34,814	28,004
	88,645	51,340
	594,527	434,197
Current Liabilities	480,822	346,253
Debt	147,844	82,101
	638,666	441,354
Equity	1,000	1,000
	248,419	82,531
	416,224	163,928
	664,643	247,459
	1,000	1,000

### The Atlantic Group of Mutual Funds Stock Funds - October, 1988

Total Return	Capital Growth	Diversification and
1988 (ytd annualized)	1988 (ytd annualized)	1988 (ytd annualized)
5 Years to Date	12.0%	18.4%
10 Years to Date	12.0%	18.4%
Net Asset Value - 9/30/88	17.0%	17.0%
1988 Income	\$11.85	\$11.85
1988 Capital Gain	\$0.00	\$0.00
1987 Income	\$0.00	\$0.00
1987 Capital Gain	\$0.00	\$0.00
# Months Dividend Paid	12	12
# Months Cap Gains Paid	12	12
Quotient Symbol	AGAF	AGAF
Fiscal Year End	12/31	12/31
Current Prospectus Date	10/1/88	10/1/88
Assets (\$,000)	\$2,400,000	\$2,400,000
Shareholders	10,000	10,000
Min Initial Investment	\$1,000	\$1,000
Min Subsequent Investment	\$1,000	\$1,000
Letter of Intent	\$1,000	\$1,000
Right of Accumulation	Yes	Yes
Exchange Privilege at NAV	Yes	Yes

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\* DATALAN with dedicated file server vs. Novell SFT with dedicated file server.

† Plus tax and handling charge. This offer is limited to customers in the United States through December 31, 1988.

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Once a powerful  
publishing tool  
available only  
to mainframe users,  
Interleaf has now  
been ported to the PC.  
The results,

# INTERLEAF: THE INDUSTRIAL- STRENGTH PUBLISHER

if you have the  
equipment to see them,  
are amazing.

**M**ost desktop publishing programs resemble an artisan's small workshop in which specialized tasks are performed to perfection. *IBM Interleaf Publisher* resembles a giant factory. It's a factory that uses precision instruments and controlled environments, but it operates on a vastly greater scale than an artisan's workshop and performs a far greater variety of tasks.

Workshop programs perform their tasks in the narrow space of a few



## ■ INTERLEAF

hundred kilobytes of DOS memory. *IBM Interleaf Publisher* uses the Phar Lap 386/DOS-Extender to expand its working space to 6MB of RAM and beyond. The workshop programs let you customize and control text to the last detail. *Interleaf* doesn't offer the same hand finishing that the smaller programs give you, but it puts you at the controls of precise, industrial-strength machinery.

With a desktop publishing program, you normally import graphics images, charts, and text files from programs designed to create them, and then you assemble and format them within the desktop program. *IBM Interleaf Publisher* can also import files, but it is designed to let you create everything you need within *Interleaf* itself. Its functions duplicate those of an advanced word processor, a graphics and illustration program, a charting program, and a desktop-publishing page formatter. And it includes features that you won't find in some of the most advanced programs that are designed to perform only one of these functions.

One of the most ambitious programs ever designed for a personal computer, *IBM Interleaf Publisher*, written by Interleaf, works quite differently from familiar PC programs. It's the PC version of a program available for years on workstations running Unix or DEC's VMS operating system. Interleaf began to adapt the program for personal computers when the IBM-standard PC and the Macintosh finally achieved the speed and the memory capacity that so enormous a system required. The PC version of *IBM Interleaf Publisher* is actually Version 3.0.

*IBM Interleaf Publisher* brings many of the conventions of large workstations into the world of the PC, and if you're an old hand at *Microsoft Windows* or the Macintosh interface, you'll need to unlearn old habits before you can feel comfortable with the new ones. When you're through, you may wonder how you ever tolerated the inefficiency of all those programs that you once thought were the last word in power and convenience.

*Interleaf* gets impressive results by demanding impressive resources from your computer. You have to begin with an 80386 processor, a specified minimum of 6MB of RAM, 25MB of free space on



## A World Apart

*IBM Interleaf Publisher* is so powerful that its proponents describe it as a total working environment. You may find, however, that the fence around that environment is a bit higher than you'd like to scale. True, *Interleaf* has its own impressive word processor and its graphics capabilities are stunning, but if you want to dump files into an *Interleaf* document from a variety of sources, you may find the list of its importation compatibilities surprisingly short. Word processing and graphics formats supported by *Interleaf* are listed below.

### WORD PROCESSING FORMATS

ASCII  
DEC's WP  
IBM's DCA  
Macintosh's RTF (Rich Text Format)  
Microsoft Word 3.0 and earlier  
MultiMate Advantage 3.6 and earlier  
Wang (most formats)  
WordStar 3.3 and earlier  
Xerox 860

### GRAPHICS FORMATS

CalComp 960 CAD/CAE graphics  
Encapsulated PostScript  
HPGL  
MacDraw .PICT  
MacPaint  
Scanned images  
TIFF

your hard disk, a mouse, a VGA or 8514/A monitor and adapter, and a PostScript printer or typesetter. You can use an EGA monitor, but you'll see only a frustratingly small section of your work at any one time.

**HARDWARE PLATFORMS** IBM certifies the program to run on its PS/2 Models 70 and 80, and we tested it on a 20-MHz Model 70 with an 8514/A monitor. At 20 MHz, *Interleaf* loads very slowly (the executable file is 1.7MB of code) but then turns impressively speedy. Unlike *PageMaker*, it can jump between distant pages in less than a second, and it applies global format changes with equal speed. Changing a 100-page document from one-column to three-column format took just 5 seconds, and converting the entire text of the same document from the default Times Roman-like typeface to Courier took only 12 seconds. Cutting and pasting is instantaneous.

Predictably, *Interleaf* processes graphics far more slowly than text. I was able to run the program on an 80386 clone with a VGA card and a mere 5MB of RAM, but I wouldn't recommend using it with that amount of memory for anything except

very short documents. You probably don't plan to spend \$2,495 on a program like this unless you intend to use it for large projects like books or catalogs—although it comes with built-in formats for items as humble as an office memo and a business envelope. *Interleaf*'s designers clearly wanted to make a program that you could use for just about anything.

*Interleaf*'s most unfamiliar aspect is its use of menus and the mouse. In *Windows* and *GEM*, a row of set menus occupies the top or side of the screen. You manipulate objects in these programs by selecting them with the mouse, then moving the mouse over to a menu and clicking your way through a series of choices. If you want to manipulate another object in a similar way, you usually have to work your way through the same menus again. And you use the left button of the mouse for all actions.

*Interleaf* makes you realize how clumsy this whole procedure is. As in the Macintosh interface, every file, every template, every grouping of files on the *Interleaf* "desktop" is an icon. Icons that represent documents or separate images are contained within folders, drawers, and cabinets—even within "books" that in-

## ■ INTERLEAF

corporate chapters and "subbooks" that you can manipulate or modify separately or as an integral part of a larger unit.

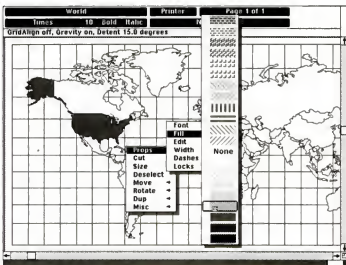
But *Interleaf* goes far beyond the Macintosh interface by eliminating the fixed menu bar. In *Interleaf*, the mouse does not have to go to the menu. The menu comes to the mouse. And a completely different menu pops up depending on the location of the cursor or the operation you are in the process of performing.

For example, with *Interleaf*, if you want to change the font on a paragraph, you click the left button on the mouse to select the paragraph and then hold down the right button to bring up a menu—which appears where the cursor is located. You don't have to move the mouse unless, for clarity's sake, you want the menu to appear elsewhere on the screen. Most items on the menu have arrows pointing to the right, and by moving the mouse a single smooth motion along one of those arrows you pop up a submenu, and then another, until you reach the size of the font you require. At this point you release the right button, and the font change is made in the document.

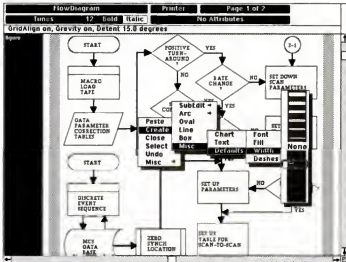
If you want to make the same change to another paragraph, just select it with the left button and click on the right button. If you want to make a different change, hold down the right button and all the submenus will reappear, showing the choice you made when you released the menu button earlier. Another smooth movement of the mouse brings you to the option you now want.

Like any factory, *Interleaf* constructs its finished products from a set of manageable parts. The basic building blocks of an *Interleaf* document are "components" containing primarily text or "frames" containing primarily graphics. *Interleaf* handles components essentially the way that other desktop programs and advanced word processors handle styles, and frames essentially the way that graphics programs handle images.

As in other desktop publishing programs, you can either select preexisting templates for documents or styles or create templates of your own that then coexist with the templates supplied by the program. *Interleaf* even modifies its own menus to include your custom templates.



After the United States section of this world map is selected, you can change any of its attributes or make a duplicate of that section to be modified or used elsewhere. Any portion of the graphic can be zoomed and pixel-edited.



This chart actually prints out with smoother curves than a VGA monitor (used to generate this screen) can display. The chart can be broken up into smaller sections for editing. Since all the nested menus appear on the screen where you position the mouse, they don't get in the way of the object you're editing.

## ■ INTERLEAF

As in other graphics programs, you create images using automatically generated lines, curves, or freehand drawing, or you can import scanned images. As in other graphics programs, you choose the format in which to present a graphic representation of numerical data, and the program generates the graph.

In each case, the general concepts are the same in *Interleaf* as they are in, say,

### **IBM Interleaf Publisher includes a customizable dictionary with all the capabilities of advanced word processors.**

*PageMaker*, *Micrografx Designer*, and *Harvard Graphics*. The essential difference lies in the way that *Interleaf* integrates all these functions with the word processor in which you generated the text at the heart of the document, and the way that *Interleaf* integrates the format and images in one document with the format and images in others. You can create links between copies of a single document so that all changes made to one copy of a chapter will affect all other copies edited by members of a workgroup.

**WORD PROCESSING** As a word processor, *Interleaf* is limited less by its own capabilities than by the current state of video technology. As in all graphics-based programs, the screen is much harder to read than it is in ordinary text mode. When you enter text, it appears in the same font that will appear in print—and all the fonts built into standard PostScript printers are available. With proportional fonts, the screen updates itself distractingly after every letter. The current line disappears for an instant and reappears with the previous-

ly typed characters moved slightly to the left or right as the program recalculates the character spacing to adjust for the character you just typed. The program would be easier to live with if it updated the current line only when you paused in your typing.

To type a new paragraph you'll have to get used to using Ctrl-Enter (or Ctrl-J) rather than Enter. The Enter key simply takes you to a new line within a component. Ctrl-Enter begins a new component. To split an existing component in two, you need to use the menu. *Interleaf* comes with keyboard equivalents for some of its menu commands but not all, and the ones you get aren't very intuitive or consistent.

Brave and expert users can puzzle out and modify an undocumented ASCII file called DEFAULT.KBD that contains the keystroke mapping. This file says you can refer to "volume 1 of the Reference Manual" for more information. Users of the IBM version do not receive any manual by that name, so you're on your own, although the keyboard appendix in the user guide supplies some pointers.

*Interleaf* includes a customizable spelling and hyphenation dictionary with all the capabilities of advanced word processors—and then some! For example, you can limit the number of consecutive lines that end in a hyphen. Block operations that you can perform on text strings include capitalizing the first letters of all words in the block. The search-and-replace function lets you search for text or formatting features through the whole document no matter where the cursor is located—a trick most word processors can't achieve. On the negative side, you can restrict the search to capitalized words, but you can't restrict it to lowercase occurrences. There is no true whole-word option, so you have to put a space before *as* in the search string if you don't want to find *mass* as you search for *asthma* and *astrology*.

For managing large documents, *Interleaf* has no rival: it includes features that go beyond even the advanced cross referencing and document linkage available in *Nota Bene* and *WordPerfect*. Besides all the standard revision-tracking, table-of-contents, indexing, and list options, you get up to five levels of indexing, with effortless transformations of index formatting. Within a document, page numbers



## FACT FILE

**IBM Interleaf  
Publisher, Version 3.0**  
IBM Corp.

*IBM Interleaf Publisher* is produced by Interleaf Inc. but marketed exclusively by IBM. Contact your local authorized IBM dealer for information.  
List Price: \$2,495

**Requires:** 6MB RAM; 25MB of hard disk space, 80386 computer; EGA, VGA, or 8514-A adapter; DOS 3.1 or later

**In Short:** The most ambitious desktop publishing program ever written for a personal computer, combining graphics-based word processing, page formatting, charting, and graphics. Designed for large workgroups as well as individual use. Not copy protected.

CIRCLE 648 ON READER SERVICE CARD

**Interleaf PCEditor, Version 3.0**  
Interleaf Inc.

10 Canal Park  
Cambridge, MA 02141  
(617) 577-9800

List Price: \$695

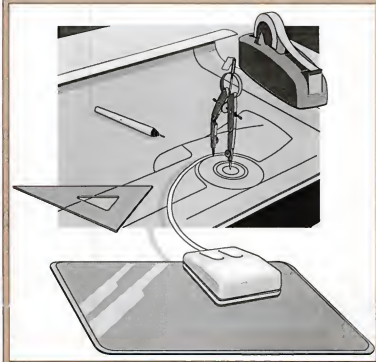
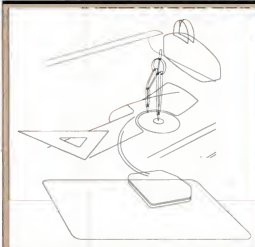
**Requires:** 512K RAM, two disk drives, DOS 3.1 or later.

**In Short:** A text editor that creates files for *IBM Interleaf Publisher* and uses the same command structure on a nongraphics screen. Not copy protected.

CIRCLE 649 ON READER SERVICE CARD

can include specified words or characters as prefixes or suffixes. You can create separate indexes for individual volumes in a series and a master index for the whole series. You can create multiple indexes of names, subjects, or any other category. You can control the way the index treats ranges of pages, so that an entry can read "4,5,6" or "4-6", and the range included in any single "4-6" sequence can be restricted to a single section of text. If you choose, the program can automatically generate names for the labels used in cross-referencing, saving you the trouble of writing a new one every time and preventing the use of duplicates.

**IMPORT TARIFFS** If you insist on importing documents from a non-graphics-based word processor, *Interleaf* doesn't give you an especially useful range of op-



*This series shows the evolution of a graphical image designed in Interleaf. The upper-left image is constructed from the wide selection of primitive shapes available in the program's design menus. In the upper-right image, many of the lines have been doubled to add shape and depth. The image to the left highlights Interleaf's shading capabilities. Any portion of the shading could be altered with a variety of brushes and pens that are offered in Interleaf's design toolbox.*

## ■ INTERLEAF

tions. The program's import menu reflects the world of PC word processing circa 1984. If you're still using *WordStar 3.3* or *Multimate Advantage 3.6*, *Interleaf* can accept them. If you use *Microsoft Word* or *WordPerfect*, you must first convert your files to plain-vanilla ASCII or IBM's DCA format before importing them. But if you have files in DEC's WP, Xerox 860, or almost any Wang format, you're in luck. *Interleaf* will also convert the Rich Text Format created by many Macintosh programs.

If you prefer to avoid converting files from another word processor, *Interleaf* will sell you its \$695 *Interleaf PC Editor*, a text-mode word processor for any IBM-compatible machine. This program lets you create or edit *Interleaf* files on a humble PC, with or without a graphics adapter. Although the program can print only in draft format and ignores graphics, it can manipulate text in all the ways *Interleaf Publisher* can.

As a page formatter, *Interleaf's* claim to fame is its robustness. You'll have to work very hard to confuse this program into making formatting mistakes that require manual intervention. No matter how complicated the arrangements of columns and graphics that I tried, *Interleaf* managed to sort out all the details. For some users, this alone may justify an upgrade from less ambitious programs.

**SOME DRAWBACKS** On the other hand, *Interleaf* isn't designed to furnish all the aesthetic options that are found in *PageMaker* or *Ventura Publisher*. You can't wrap text around a picture. Unless you transform a text string into a graphics element (which means that you will no longer be able to modify that bit of text with the program's word processing functions), you can't use manual kerning, and there's no automatic kerning at all.

There are no options for adjusting the standard spacing between words or letters, hence you lack one of the subtle methods used by book designers to alter the amount of text that appears on a page and ensure balance between two facing pages. *Interleaf* does let you balance facing pages with a feature called *vertical justification*, which compresses or enlarges the space between the lines or paragraphs until a page reaches the desired length. Book de-

signers, however, regard this cure as being sometimes worse than the disease because it can break the alignment between lines of text on one page and the next.

**IMAGE MAKING** *Interleaf* excels in its creation and editing of images. *PageMaker* and *Ventura Publisher* let you draw lines, circles, ellipses, and boxes, but *Interleaf* lets you design extremely elaborate images from groups and subgroups of graphics primitives. As in any advanced drawing program, you can duplicate, mirror, rotate, resize, and align objects. You can edit separate elements of a diagram. You can move objects along a diagonal, change horizontal or vertical sizing, center objects within a frame, rotate an image freely or at fixed intervals such as 30 de-

### IBM Interleaf Publisher lets you design extremely elaborate images from groups and subgroups of graphics primitives.

■

grees, or rotate an object around any point.

*Interleaf* lets you lock an object against changes made to associated objects or against changes like fill patterns. You can even lock an object from being printed but keep it visible on-screen as an aid to designing other objects. You can also specify the "gravity" of different objects and make them snap together when you move them close to one another. Full-face diagrams can be transformed into isometrics. Sharp-angled polygons can be converted into curved splines and then converted back again.

The two sets of graphics fonts let you manipulate text as if it were a diagram. One set uses characters made up of separate lines or blocks. Using these, you can

construct text letter by letter and can resize and rotate individual characters or use different fill patterns. The second set consists of two PostScript-style outline fonts into which you can convert existing text for subtler design and easier control over longer strings.

The program comes with a set of arrows, borders, flow-chart diagrams, and other miscellaneous shapes—all of them suitable for modification. Maps of the United States and the world can be broken up into separate states and countries.

While you can perform any imaginable operation on conic sections, *Interleaf* does not provide Bezier curves—a restriction that reflects the program's origins in the world of technical workstations rather than in the artisans' workshops of graphics design studios. You won't be able to import every new-age design created in your illustration programs, either. *Interleaf* accepts only graphics files created in the Hewlett-Packard Graphics Language (HPGL) format, the *MacDraw* PICT format, and the CalComp 960 CAD/CAE graphics used for plotters.

*Interleaf* is only a bit more welcoming to bit-mapped image files. You can import any TIFF image generated by a scanner, as well as *MacPaint* files and images in the special format used by IBM's scanners. You can modify bit-mapped images by using any of five brush shapes, and you can also use these brushes to unerase parts of a modified image back to the original. With line art, but not with gray-scale images, you can fill open areas of an image or alter individual pixels. A *contrast editor*, apparently designed so that a future version of the program will let you adjust the degree of contrast between light and dark areas of a gray-scale image, is limited in the current IBM version to an option that lets you convert a black-on-white line drawing into white-on-black. (Users of the workstation versions of the program can buy a full pixel and contrast editor as an option now.)

**CHARTING FEATURES** As a charting program, *IBM Interleaf Publisher* is rich in options but, for PC users, somewhat short on convenience. Although the program includes almost everything else, it doesn't have a spreadsheet, so you will probably import much of your chart data from an-

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## ■ INTERLEAF

other program. *Interleaf* won't read *Lotus 1-2-3* files directly; instead it makes you import spreadsheet data in an ASCII or word processing document, select the data, and then paste it into a chart.

Once you have your data, you have a wide range of presentation methods—as long as you don't want to get fancy with three-dimensional graphs. You are able to select the standard line, bar, pie, and scatter charts, with a variety of fill patterns, hatch marks, and borders.

No matter how precisely you want to customize a chart, *Interleaf* can accommodate you. You can specify the dimensions of borders, hatch marks, and other features in *Interleaf's* smallest unit of measurement, the *ridiculously small unit* (RSU) of one millionth of an inch. A few hundred RSUs in any direction may not make much difference on your printer, so you have plenty of room to experiment with different values.

With so many options, *Interleaf* gives you plenty of escape routes when you or the program runs into trouble. At the end of every session, you have the chance to restore the original state of the document. The program has the ability to generate periodic additional backups after a definable number of keystrokes. If the program runs out of memory or begins to fail in some other way, you can create invaluable "crash files" before the program closes down. When you start up the program again, you can choose to resume editing from the original version, the periodic backup copy, or the crash file.

*Interleaf* won't say what's next in the IBM version of the program, but it's possible to make some educated guesses on the basis of other versions. Users of the Macintosh version recently received a free upgrade to Version 3.5, which allows the use of downloadable PostScript fonts. And attendees of trade shows have seen Version 4.0 for workstations, which includes controls over word and character spacing and other advanced graphics features. For its intended purpose, *Interleaf's* Version 3.0 is already a tremendous success. The prospects for the future are even more impressive. [E]

*Edward Mendelson is a contributing editor of PC Magazine.*



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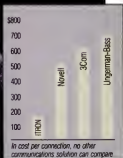
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# BUILDING WORKGROUP SOLUTIONS: APPLETALK

*Finally, Apple has joined other manufacturers in providing products for its networking system that will improve Mac-to-PC communications.*

A year ago, integrating MS-DOS-based PCs with Apple Macintosh systems was a technical challenge. Today, the only problem you have when you want to mate Macs and PCs in a network is choosing the right alternative from a growing number of compa-

## PC/MAC INTEGRATION

While AppleTalk is an interesting product because it comes from Apple and seems destined for increasing support, it is not the only product in the PC/Mac integration market. The first step in deciding which product is right for you is to define what you want to do through the link.

A network performs three major functions: file transfer, printer sharing, and multiple simultaneous access to data files. Allowing two or more application programs to share the same data files at the same time is clearly the most difficult and complex task.

If all you want is just to exchange data files between Macs and PCs, then simply exchanging diskettes makes a lot of sense. A \$159 product called the Copy II PC Deluxe Option Board from Central Point Software installs in standard PCs. If your PC has a 3½-inch drive, it gains the ability to read and write Macintosh-formatted diskettes. Contact Central Point Software at 15220 Northwest Greenbrier Pkwy., #200, Beaverton, OR 97006; (503) 690-8090.

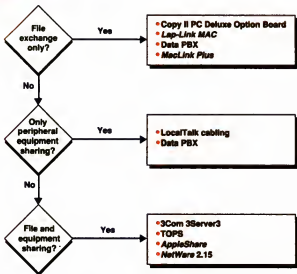
To make matters more automated, simply connect Macs and PCs through their serial ports. Traveling Software has a \$139.95 product called *Lap-Link MAC* that includes software and the connecting cable for both types of computers. *Lap-Link MAC* is a PC-oriented program that allows an exchange of files in both directions. The major screen displays appear on the PC, and all actions are initiated from the PC. The entire Mac filename is shown on the PC, and it is up to you to rename files for DOS compatibility. Contact Traveling Software at 19310 North-Creek Pkwy., Bothell, WA 98010; (206) 483-8088.

nies. 3Com Corp., DEC, and TOPS deliver products that network Macs and PCs, and Novell has announced a product designed to host Macs on *NetWare* for delivery at the end of this year.

A renewed emphasis on networking and connectivity is also evident at Apple it-



### The PC-to-Mac Connectivity Decision Guide



Yet another approach is offered by Dynamic Microprocessor Associates. DMA combines its \$145 DOS product, *pcAnywhere III*, with its Mac program, *PC MacTerm*. When you connect the two computers through their serial ports and run both programs, the PC's screen appears in a window on the Mac's screen. The Mac operator can run programs on the PC remotely and can transfer files between the machines. Contact

Dynamic Microprocessor Associates Inc. at 60 E. 42nd St., New York, NY 10165; (212) 687-7115.

If you need more flexibility and perhaps the ability to share some peripherals, then a data PBX (also called a data switch) is an excellent linking device. Companies like Newbridge Networks (Herndon, Virginia), Western Telematic (Irvine, California), and Equinox systems (Miami, Florida) all market prod-

self. In fact, Apple recently joined the growing list of companies selling products designed to make the PC to Mac connection. You are now able to buy Apple network interface cards and software that will help make your PCs part of a combined network with Macs.

AppleTalk is the trademarked name that describes Apple's overall networking system. AppleTalk was once the name used for the network cabling scheme built into Mac computers. Apple realigned the names, and now AppleTalk designates the entire system. The cabling scheme is

ucts that let a mixture of a dozen or more Macs, PCs, laptops, and other computers talk to one another and share printers, plotters, and modems. Northern Telecom (Richardson, Texas) actively markets products that let *thousands* of machines interact the same way. Data switches typically have a cost-per-port of slightly over \$100 and are simple to set up and use.

Once you move files from one kind of machine to another on a diskette or over some kind of serial link, you still face the problem of file compatibility. Many programs on Macs and PCs will import and export compatible files, and some companies market PC and Macintosh versions that use identical files.

Utility programs like *MacLink Plus* from DataViz translate between 45 combinations of common PC and Mac file formats such as *Lotus 1-2-3*, *dBASE II* and *III*, *WordStar*, *MultiMate*, *Microsoft Excel*, *Jazz*, and *MacWrite*. The \$195 *MacLink Plus* package includes software that runs on the Mac and PC and a cable that connects them. File transfers are initiated on the Mac, and file translation is done there also. Contact DataViz Inc. at 35 Corporate Dr., Trumbull, CT 06611; (203) 268-0030.

**PRINTERS AND FILES** The best way to share Apple LaserWriter printers between PCs and Macs is over LocalTalk cabling. It isn't necessary to have a file server on the cable to share LaserWriters, and DOS-based computers don't need a lot of software beyond an application able to produce a "PostScript" output and a piece of driver software to send the file out a LocalTalk port. The LocalTalk port can be on a separate expansion card,

or it can be included as a value-added feature on a card serving an entirely different purpose.

However, if you want to have multiple simultaneous access to the same data files, then you need file-sharing software and a server. *AppleShare* is one alternative, but many other companies are either cooperating or competing.

**TOPS** ("Making Connections: TOPS," *PC Magazine*, May 31, 1988) is a LAN operating system from TOPS (Alameda, California) that can link Macs, PCs, and Unix-based computers. TOPS is compatible with LocalTalk hardware, and the company supports a faster version of the wiring scheme, too. Under TOPS, the PC user sees a DOS-type listing of the files on the Mac, and the Mac user sees icons representing the files on the PC.

3Com Corp. supports the LocalTalk wiring scheme by including a LocalTalk port on every 3Com 3+ server. However, 3Com markets its own software for the Mac, which is not compatible with *AppleShare* at this time. Representatives from 3Com state that 3Com will support the Apple Communications Framework in its new LAN operating system based on OS/2, 3+ or Open.

Novell has announced a version of *NetWare* (Version 2.15) called *NetWare for the Macintosh* that understands the requests sent over the network by *AppleShare*-equipped Mac workstations. Taken together with the released DEC products, it means that Macs configured as network workstations could simultaneously use files on PCs running under *NetWare*, VAX minis running under DEC's VMS, and Macs running under *AppleShare*.—Frank J. Derfler, Jr.

called LocalTalk, and Apple's networking software is called *AppleShare*.

Together, the pieces of the AppleTalk system allow the people who integrate Mac and IBM-standard computers to use Mac IIs as file servers and to share Apple LaserWriter printers. An important dis-

tinguishment between AppleTalk and other networks is that the printers are standalone nodes on the Apple network—they aren't peripherals that need the processing power of a print server computer. Together with products from other companies, AppleTalk-equipped machines can use PCs of

various types and even DEC VAX mini-computers as file and communications servers.

Connection between PCs and Macs doesn't mean full integration, but file sharing and file exchange between programs on these computers is improving. Since local area networks are connection schemes that treat data as a series of zeros and ones, they don't take file formats used by specific programs into account. Nevertheless, similar programs designed by companies like Microsoft for both Mac and MS-DOS machines can interchange files and common file formats like .DIF. Apple and other companies also have utilities available that translate between popular programs.

The result of all this is that the Macintosh is no longer out on a limb. Several good ways now exist to integrate it into workgroup information environments.

**APPLE COMMUNICATIONS** IBM set the profile for companies that want to enter the computer communications market. If you want people to take you seriously, you have to develop and document a connectivity plan, load it with acronyms, and educate people in the buzzwords.

Apple wants people to think of it as a company that is serious about computer communications, so it has developed a plan it calls the Apple Communications Framework (ACF). Wisely, this plan aims



## FACT FILE

### AppleTalk

Apple Computer Inc.  
20525 Mariani Ave.  
Cupertino, CA 95014  
(408) 996-1010

List Price: *AppleShare* PC software, \$149 per PC node; *AppleShare* file-sharing software for the Mac, \$799; LocalTalk PC-to-Mac communication. The down side is *AppleTalk*'s extremely slow performance and the cost of installing the dedicated Mac II that it needs to operate.

**In Short:** Easy-to-use *AppleShare* PC software on an *AppleTalk* network is one of the best tools around for simplifying PC-to-Mac communication. The down side is *AppleTalk*'s extremely slow performance and the cost of installing the dedicated Mac II that it needs to operate.

CIRCLE 602 ON READER SERVICE CARD





## Benchmark Tests: AppleTalk

AppleTalk is not a fast networking architecture. Trying to get at the processing power of the Mac II through LocalTalk is like trying to view the ceiling of the Sistine Chapel through a keyhole.

Note the large percentage increase in AppleTalk's Network Speed Under Load test times as load stations are added. This is a significantly higher percentage than is the case for even the relatively slow TOPS FlashCard. (The TOPS FlashCard operates at 770 kilobits per second as compared with LocalTalk's 236 kilobits per second.)

None of the other network benchmark test results listed here use a Mac as a server, so it is difficult to judge the efficiency of the AppleShare software. The results of the Hard Disk Access Load test were probably influenced by the limited LocalTalk attachment, but in the Database Load test the processing power of the Mac's 32-bit 16-MHz processor starts to shine through the keyhole.

### Performance Times

(Times given in seconds)

#### Network Speed Under Load

Server	Interface card	Software	Zero stations	One station	Two stations	Three stations	Four stations
Macintosh II	LocalTalk PC	AppleShare	1,818	1,708	1,869	2,016	2,212
8-MHz IBM PC AT	TOPS FlashCard	TOPS	1,137	1,172	1,239	1,354	1,577
3Com 3Server3	EtherLink	3+Share	306	432	529	651	761
8-MHz IBM PC AT	EtherLink	Advanced NetWare/286	264	280	301	310	322

#### Hard Disk Access Load

Server	Interface card	Software	Zero stations	One station	Two stations	Three stations	Four stations
Macintosh II	LocalTalk PC	AppleShare	782	1,078	1,830	2,613	3,299
8-MHz IBM PC AT	TOPS FlashCard	TOPS	636	1,209	1,446	1,919	2,643
3Com 3Server3	EtherLink	3+Share	155	227	330	419	522
8-MHz IBM PC AT	EtherLink	Advanced NetWare/286	136	150	162	174	182

#### Database Load

Server	Interface card	Software	Zero stations	One station	Two stations	Three stations	Four stations
Macintosh II	LocalTalk PC	AppleShare	782	909	982	1,027	1,073
8-MHz IBM PC AT	TOPS FlashCard	TOPS	636	848	801	1,068	1,146
3Com 3Server3	EtherLink	3+Share	155	298	425	585	669
8-MHz IBM PC AT	EtherLink	Advanced NetWare/286	136	169	212	280	305

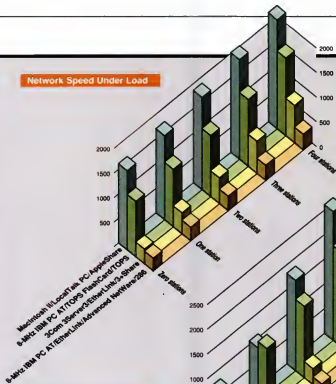
The Network Speed Under Load and the Hard Disk Access Load benchmark tests measure the time needed to perform a standardized task on the network. While the actual work loads used for these two tests (described below) are different, we used the same procedure for both. To obtain the elapsed times shown here, we ran a benchmark program performing a sequential create, a sequential read, a sequential write, a random read, and a random write of a large file. The record sizes used in these activities systematically rotate between 16K, 4K, and 512 bytes. The numbers shown are the total time necessary for all of these operations. We ran the test on all our ATs to load the network while timing just one of them. We then reduced the number of workstations one at a time to show the effect of loading on the network.

The Network Speed Under Load test puts a heavy load on the network interface (cards, media, and so forth) while placing a minimal load on the hard disk by having each station continuously read and write its own 1-byte data file, changing the data each time. For systems with disk caching, the load on the hard disk is even smaller, since cached systems typically perform a disk write but do not require a physical disk read.

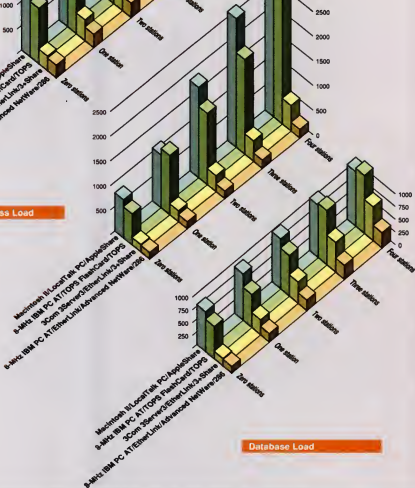
The Hard Disk Access Load test heavily loads the hard disk and disk caching system. To do this, each station randomly accesses its own 100K data file using 1K records. Data written to the file is changed each time. The random reads typically access data outside the cache, which forces a disk read, as does any write.

The Database Load test exercises the system's record-locking support and the way it handles a number of random simultaneous accesses to a common file. This test times how fast each loading station accesses a common database consisting of an index file and a data file. Half the accesses are simple searches of the index file and an accompanying access to a record in the data file. One quarter of the accesses perform the same operation but also lock the data record and update its contents. The remaining accesses update the index file and a data record. The index file is locked during every update, and the DOS 3.1 RLOCK statement prevents simultaneous index file updates.

### Network Speed Under Load



### Hard Disk Access Load



### Database Load

## THE APPLE-DEC CONNECTION

*Interesting developments at Digital may lead to a happy coexistence between Mac and VAX technology.*

The strengthening links between Apple and DEC computers have resulted from a high-level corporate commitment made by both companies, a commitment most clearly shown during a joint Apple-Digital developers' conference held in mid-1988. The purpose of this conference was to encourage third-party developers to design products that supported both computer architectures.

Recently DEC released AppleTalk for VMS, a network system that allows a DEC VAX to appear as a server on an AppleTalk network. This means that both Macs and PCs running *AppleShare* PC can use the VAX as a server in addition

to other network file servers. It also potentially gives DEC-based applications access to Apple's LaserWriter printers.

While DEC has a program called *VMS Services for MS-DOS* that performs the same functions as *AppleShare* PC does for networks of PCs, the company has never had the cooperation of IBM or other large vendors of MS-DOS-based computers in marketing the product. Closer ties between Mac and DEC computers could quickly lead to the Mac's becoming an important graphics workstation for VAX processors.

—Frank J. Derfler, Jr.

at integrating Apple and non-Apple products. Apple is helping many companies develop gateways and other kinds of links between the Mac and other computer systems (see sidebar, "The Apple-DEC Connection").

Let's take a look at the AppleTalk network components and see how they integrate with PC networks. We'll start with the wiring scheme, called LocalTalk.

**LOCAL TALK** LocalTalk has the lowest-rated throughput of any wiring scheme in the LAN industry, but it is flexible, simple to connect, and widely available. LocalTalk wiring is built into Macintosh computers and is available on LaserWriter and ImageWriter printers. The chips that make it work are so inexpensive that companies like Orchid Technology include them at no extra cost as a value-added feature on their video cards.

Technically, LocalTalk uses EIA standard RS-422 signaling (a faster and more robust evolution of the common RS-232C) in a physical point-to-point wiring scheme. A multiconductor shielded cable runs from node to node.

Each LocalTalk node taps into the cable

through a connector box. The connector box links two pieces of cable on the network side and attaches to the node with a single cable. The various Apple products have one of two connectors installed, so you must make sure you have the right connector box for the node.

LocalTalk has a rated transmission speed of 230.4 kilobits per second. While I've written many times that the rated speed of the cable is not a major factor in determining network response time, LocalTalk is the slowest media-sharing scheme on the market—and the speed of the cable does play a part in network response. LocalTalk is limited to a maximum of 32 connections per network, but you will have to evaluate the work load on the network carefully to see how many stations LocalTalk can serve without a significant falloff in response time.

The Apple LocalTalk cabling scheme uses shielded twisted-pair wire. If you're installing a network in one room, it's easy to run the prepared cables that Apple sells in installation kits. And since almost no buildings are prewired with shielded twisted-pair, LocalTalk is often used in networks that really are local, or contained in

one or two rooms. Larger networks require special wiring installations, and to this end Apple markets preassembled 10- and 25-meter LocalTalk cable kits and a do-it-yourself customization kit with 100 meters of wire, plugs, and splicers. If you want to use preinstalled unshielded telephone wire, Farallon Computing (Berkeley, California) markets a wiring system called PhoneNet that integrates with LocalTalk and uses standard telephone wire. The PhoneNet wiring scheme allows for cable runs of up to 3,000 feet and for extensions through bridges and repeaters.

Du Pont markets a fiber-optic LocalTalk card. Using fiber-optic cable doesn't make LocalTalk any faster, but it does allow cable runs of up to 40,000 feet.

The PC connections into LocalTalk come through Apple's LocalTalk PC card. This PC-bus half-length card has a single 9-pin connector on the back for the LocalTalk cable connection.

**APPLESHARE** The software that Apple sells for networking is called *AppleShare*. The *AppleShare* file-sharing software runs on a Macintosh Plus, Macintosh SE, or Macintosh II. *AppleShare* requires the dedicated services of the machine acting as a file server; hence the Mac isn't available to run other application programs at the same time.

Following an architecture that is now typical of personal computer networks, each *AppleShare* file server has an assigned name. Each hard disk on a server is known as a volume, and each volume has a name. For example, a typical server name might be ACCNTG and a volume name might be PAYABLES. PAYABLES might be divided into 12 subvolumes, one for each month.

The software running on the Mac has a security scheme that suffices for most installations. The network administrator loads user names and passwords into the system and attaches specific privileges to each name; this procedure resembles those of the Novell, 3Com, and Banyan LAN software systems. One major difference, however, is that in *AppleShare*, the administrator has to initiate all actions on the server.

Another difference is that *AppleShare* doesn't have quite as many categories of



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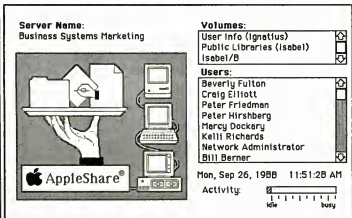
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AppleShare PC's Desk Accessory utility provides a good way to select network resources and give them DOS names. Server, volume, and user names are clearly listed and easy to scroll through, and help is available at every level.

privileges as other popular file-server programs do. Although it uses different words to identify the functions, AppleShare has the equivalent of the DOS read-only and the DOS read-write-create (RWC) privilege categories. The RWC privileges aren't broken apart as they are under DOS, and there are no specialized privileges such as execute-only that you find in some DOS-based software.

Here at PC LAN Labs we found that AppleShare on the Mac is the easiest file server software to install and use that we have ever seen. The AppleShare menus, working in the typical Mac point-and-shoot graphics interface, make bringing up the network very simple. You don't have to be a Mac or PC guru to make the file server operational, and print service is built into Apple printers on LocalTalk. However, you still need a strong knowledge of DOS file and directory structures to get the PCs working as network stations.

**APPLESHARE PC** Apple's AppleShare PC software loads into each PC in the network and makes the PC a client of the Mac server. There is no capability in the AppleShare system that lets a PC act as a file or print server for other PCs or for Macs.

The AppleShare PC software package has five major parts. Three programs are

always resident in RAM when the PC is a part of the network. These are a *redirector* that works with DOS to route the appropriate requests to the server, a piece of software called *MINSES.EXE* that handles communications between the nodes on the network, and a program called *ATALK.EXE* that moves data to and from the LocalTalk PC card.

The redirector and the two other memory-resident programs occupy about 67K of RAM. It is important to note that these programs load from AUTOEXEC.BAT or the DOS command line, hence you don't have to call them until you need them. They are not CONFIG.SYS device drivers that load at boot time and occupy RAM whether you use the network or not.

AppleShare PC also includes a menu-driven program called *Desk Accessory* that displays available network resources and programs the redirector. *Desk Accessory* can be either set up as a terminate-and-stay-resident program or called from the DOS command line and used as a transient program when needed. The program can take as much as 85K of RAM, so you'll have to plan the RAM needs on each PC carefully before making *Desk Accessory* memory resident. Since, as we'll describe, you can do the same job through batch files, *Desk Accessory* is a nice gee-whiz

product that will be used only by someone making temporary changes to his own network resource assignments.

The user interface for *Desk Accessory* is clearly Apple inspired. The screen is divided into windows, and the windows are further subdivided into panes. The menu system begs for a mouse, but the Tab key and other keyboard keys make a suitable substitute. The PC's function keys initiate many of the *Desk Accessory* commands, and all those function-key assignments are displayed at the bottom of the windows.

## COMMAND-LINE PROGRAMMING

If *Desk Accessory* were the only way to program the redirector in each workstation, the network administrator would have to spend a lot of time configuring each network station. Happily, the Apple software includes a command-line programming syntax. Most network installers and administrators will probably use batch files and leave *Desk Accessory* to a relatively small group of people: sophisticates who want to change their drives and directories around without making command line or batch file entries.

The AppleShare PC command verbs and syntax look and feel a lot like Novell's *NetWare*. For example, the verb MAP, also used by Novell, assigns disk drives to server resources instead of the NET USE command common in DOS-based networks.

*Desk Accessory* displays the servers and printers on the network and lets you assign DOS names to them. For example, using either *Desk Accessory* or .BAT files, you can make the volume called PAYABLES, on the Mac server called ACCNTG, the P: drive on your PC. You can assign different DOS drive letters to different volumes on the same server and to different servers. Once you assign a DOS name to a particular resource, you use the standard DOS commands to make, delete, and copy subdirectories and files.

**NETWORK PRINTING** There are two ways to use LocalTalk-equipped printers: directly and through emulation. The LocalTalk PC package includes a program called *PC LaserWriter* that works well with DOS application programs and knows how to address an Apple printer.

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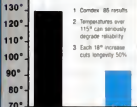


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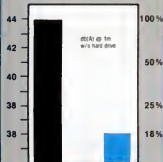
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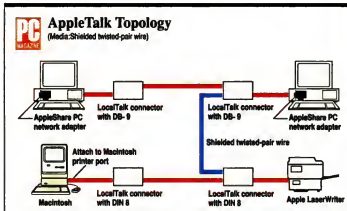
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## ■ APPLTALK



Apple LaserWriters connected into an AppleTalk network operate as standalone nodes rather than as peripherals that need the CPU power of a print server PC. The LocalTalk wiring scheme has the lowest rated throughput of any cabling system on the market, but its slow performance is partially compensated for by its easy installation, flexibility, and wide availability.



Applications like *WordPerfect* and *Microsoft Word*, which can print directly to a LaserWriter, work with *PC LaserWriter* to send the output through LocalTalk to the printer you select.

Since many PC applications don't have PostScript-compatible output, Apple makes it possible to print the output from these programs on an Apple printer using another utility program called *AppleTalk PC Printer Driver*. The program takes the

output that the DOS program produces in an Epson-compatible print file and sends it to the Apple printer. You then have to quit the DOS application and submit that print file to the *AppleTalk PC Printer Driver*. This isn't very convenient, but it works.

If anything more complex than casual sharing of a LaserWriter is planned, then the *AppleShare* file server can run a utility program called *LaserShare* that collects and spools print jobs.

**MAC MEETS DOS** The most obvious problem encountered in sharing Mac and DOS files has to do with filenames. The Mac can have file and directory names up to 31 characters long. These names can contain any ASCII character, including a space. In contrast, the PC allows only 11 characters, and the types of characters are limited. PC filenames aren't a problem on the Mac, but the names of files that people create on the Mac can be too much for DOS to handle.

The *AppleShare* software in the Mac server keeps both a Mac name and a DOS-legal name for each file and directory. When a Mac name is not DOS legal, *AppleShare* truncates the name according to certain rules. The truncated name begins with an exclamation point to emphasize that it was created by a Mac application.

While using different rules for filenames is the most obvious PC/Mac compatibility problem, the differences in application-program file formats cause the most serious problems. The good news is that, increasingly, programs on the Mac can use data files created by programs on the PC through intrinsic import/export utilities. Microsoft and other companies market popular programs that use the same data files for both machines. Apple attacks this problem itself by including a translation program in *AppleShare*.

The final part of the *AppleShare PC* package is a file translator that moves data between MacWrite file formats and files in Document Contents Architecture (DCA) format.

**THE BOTTOM LINE** Apple's contribution to the Mac/PC networking market has some strong pros and two cons. The biggest feature of *AppleShare*, aside from the obvious appeal to people who want to share files between Macs and PCs, is its clean and simple operation. Almost any computer-aware person could set up the file server without reading the manual. The server software has several features and utilities (one example is the ability to do a systematic shutdown, including shutting off the entire computer) that are innovative.

Some buyers of *AppleShare PC* will want it only because it lets DOS programs with PostScript output share Apple Laser-

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CIRCLE 327 ON READER SERVICE CARD

### ■ APPLLETALK

Writer printers, and that is certainly an excellent reason.

The two biggest drawbacks to *AppleShare* are cost and speed. I didn't say price, because the *AppleShare* software and the *AppleShare* PC hardware aren't overpriced. But the cost of dedicating a Mac II as a file server is very high. All the graphics, sound synthesis, and most of the processing power of the machine are simply wasted.

You'll also find that the Mac II CPU slows down under the heaviest network load because LocalTalk is just too slow a communications channel with respect to

■ Some buyers of *AppleShare PC* will want it only because it lets DOS programs with PostScript output share Apple LaserWriter printers—an excellent reason.

the power of the computers using it. The highly graphical world of the Apple product line particularly needs more throughput than LocalTalk can handle.

Apple and several other companies market Ethernet cards for the Mac SE and Mac II expansion bus, but Apple does not yet supply drivers for Ethernet cards for *AppleShare PC* running under DOS. If you plan to link Macs and PCs using *AppleShare*, you must use LocalTalk cabling. Apple is in the process of releasing the information that network adapter card manufacturers need to write their own drivers. When PC Ethernet cards become available with *AppleShare* drivers, one of the major limitations of *AppleShare* will disappear. Then *AppleShare* could well reach its potential as a major PC and Macintosh networking product. □

Frank J. Derfler, Jr., is workgroup systems editor of PC Magazine.

The collage features several overlapping forms and spreadsheets. At the top, a form titled 'Employee Record' includes fields for 'Name and Address', 'Date of Birth', 'Date of Hire', and 'Date of Termination'. Below it, another 'Employee Record' form shows a grid for tracking 'Hours Worked' and 'Payable Amount'. To the right, a 'Business Record' form is visible, with sections for 'Business Name', 'Address', and 'Phone Number'. At the bottom, a 'Inventory Record' form displays a grid for recording 'Item Name', 'Quantity', and 'Unit Price'. The forms are printed on dot matrix paper, which is characterized by its grid of small dots.

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1-

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CIRCLE 174 ON READER SERVICE CARD

PCM 12/27/88

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CIRCLE 165 ON READER SERVICE CARD

# THE GREAT DIVIDE

**EISA vs. MICRO CHANNEL**

*By announcing the coming of the EISA bus as a direct competitor to IBM's Micro Channel architecture, Compaq and its collaborators have started a battle for control of the future. What are the advantages of each standard? Will a clear winner lead the way into the 1990s?*

After 4 years in a fast-changing, technology-driven market, the classic AT bus no longer fulfills our ever-rising expectations. Everyone wants fast action and mega-memory, but the AT is woefully ill equipped to handle either. Personal computers are shifting from running one application at a time to true multitasking, but AT architecture quickly bogs down when

the number of tasks goes up.

Despite these deficiencies, all the top-selling computers today—both 80286- and 80386-based machines—remain bound to the aged standard.

The IBM-anointed successor to the AT bus was introduced in April 1987 as Micro Channel architecture, the expansion provisions of the high end of its Personal System/2





## Board vs. Board: How EISA and MCA Measure Up

**M**icro Channel add-in boards measure 3 1/2 by 11 1/2 inches. EISA boards stick with the 4 1/2 by 13 1/2-inch dimensions of the AT format. The difference in available board space is more significant—36 square inches for Micro Channel versus 63 square inches for EISA—but Micro Channel encourages the use of surface-mount components, which can be applied to either side of the circuit board, enlarging the effective board area to 72 square inches. The most obvious benefit of surface-mount technology and smaller add-in boards is smaller PC boxes. One of the biggest selling points of desktop PS/2s is their small footprint.

The larger size of EISA boards has its own advantages, however, including more room for circuitry (which allows more functions to be packed on each card) and more power availability, up to 22.5 watts per board.

By clinging to the AT standard for board size, the EISA bus retains compatibility with all previous expansion boards, from 8-bit PC-era boards to 16-bit AT-style boards. It adds its new 32-bit capabilities and bus arbitration through an auxiliary connector installed between the ordinary 16-bit connectors in expansion slots. A special connector extends out of the board to the new bus jacks.

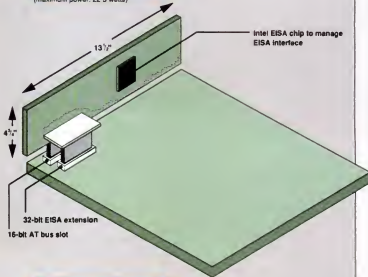
Using the side-by-side connector design instead of adding more contacts in line with the existing AT jack was probably motivated by two physical issues. Putting all the extra connections in line would have created a connector that runs nearly the full length of the expansion card, and little room would have been left on the system board for electrical components. In addition, the proprietary memory cards in many existing computers have added contacts on the bottom of cards beyond the 16-bit AT edge connectors. By putting the EISA connector to the side, the new bus remains physically compatible with these specialized memory boards.

The side-by-side connectors do pose some problems. They add several new potential misalignments to the system, which will increase the force needed to insert cards, and they may also preclude the possibility of using visionless robots to insert cards automatically during PC production.

The side-by-side connectors also complicate the layout of the system board, and the additional layers in the circuit board increase the board's cost. One other problem: the connectors move high-frequency signals away from the shielding that the expansion cards themselves afford, making interference suppression more difficult.—Winn L. Rosch

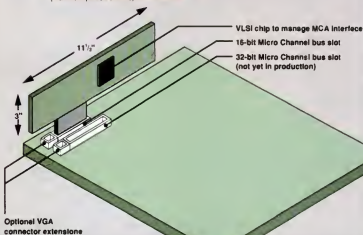
### EISA board

(maximum power: 22.5 watts)



### MCA board

(maximum power: 8 watts)



line of computers. Incorporating many design techniques drawn from IBM's larger computers, the Micro Channel is almost universally acknowledged as a great advance. Not only does MCA add welcome features such as bus arbitration—specifically designed for multitasking—but it also provides a potential standard for 32-bit expansion buses.

**WHERE'S MCA?** From the dearth of compatible Micro Channel computers on the market, however, it looks as if IBM gave a standard and no one came. Release of the first few Micro Channel-compatible machines announced by third-party vendors such as Dell Computer was put on indefinite hold (though Tandy is now shipping its 5000 MC).

Why aren't MCA machines selling up to IBM's expectations? Are choice-conscious consumers wary of being forced to buy IBM without having the chance to look at a cheaper MCA clone market? Are add-in board manufacturers unwilling or unable to invest in the research and development necessary to rework their products for MCA? Is there perhaps no perceived technical superiority in the Micro Channel that can be demonstrated here and now, and not 5 years down the line?

To sidestep MCA licensing issues while supplying many of the Micro Channel's features, an industry consortium led by Compaq Computer Corp. and comprising AST, Epson, Hewlett-Packard, NEC, Olivetti, Tandy, Wyse, and Zenith announced its own standard on September 13. Called the Extended Industry Standard Architecture, or EISA, the proposed bus offers features very similar to those of the Micro Channel but with a very different implementation. Instead of replacing the AT bus, EISA expands upon it.

The question of which bus is better won't be answerable until the first machines that use EISA become available, but both are certainly superior to the AT bus: both will deliver 32-bit power to new PCs and use hardware fully capable of exploiting multitasking software, and both have a great deal of potential.

**BUS SPECS** The basic requirement of any expansion bus is simple. It must furnish the connections needed for moving

data between the add-in board circuits, the system board memory, the microprocessor, and the other circuitry of the computer. It must supply a path for data and paths for addressing memory to find that data. The bus standard must also define the method by which data transfers are negotiated and carried out, the speed at which they take place, and how conflicting requests for its limited resources are resolved.

Both Micro Channel and EISA are designed to add to the factory endowment of a computer. The buses let you plug new power into the machine to enhance its operation, making available features such as additional memory, mainframe communications, and high-resolution video. The design of the expansion bus of a computer determines what enhancement products will work with the computer, as well as how fast and efficiently they operate.

You'll find that the expansion bus standards define the size and physical arrangement of the bus connectors used in the more powerful PS/2s, the electrical signals they carry, and the logical functions that dictate how the entire system works.

Keeping the computer and its enhancements operating properly also demands some housekeeping signals on the bus, such as clock signals to synchronize the operation of all the parts of the computer system. The new designs incorporate arbitration systems that allow devices on expansion boards to take over control of the computer from its resident microprocessor, preventing conflict and interference from other such devices.

In designing an expansion bus, some of the engineer's concerns are pragmatic: how all the connections are arranged, what sort of connector to use, even how large or small that expansion board may be and how much power it can use. The number of connections must be at least large enough to support all the functions of the bus, the cards must be small enough to fit into the case of the proposed computer, and so on. Even so, the possibilities are almost endless.

The expansion bus of the PC represents the simplest design. Essentially it traffics all the signals used by the microprocessor, boosted or buffered so that several expansion boards can be plugged into it. It is



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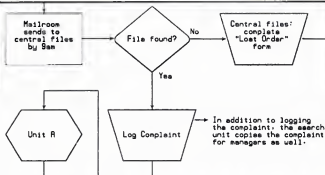


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## ■ EISA VS. MCA

augmented by a bare minimum of support circuitry such as hardware interrupt controllers and direct memory access (DMA) controllers.

The popular AT bus merely filled in the holes. It added enough address and data lines to handle the capabilities of the 80286 microprocessor and boosted the number of interrupt and DMA channels to make up for the paltry resources of the PC. In operation, however, it was not significantly different from the bus of the PC.

From a hardware perspective, the AT bus is a free-for-all. When several expansion devices demand its time simultaneously, the only way to manage the conflicts is through software. The AT's microprocessor has to devote its time to the task of bus management, an effort that can severely cut into the time the chip can devote to performing the tasks you expect it to run.

Both Micro Channel and EISA break away from that basic PC/XT/AT design.

**HOW MCA AND EISA DO IT** Micro Channel architecture represents a rethinking of the computer expansion slot, an improvement to match state-of-the-art technology. It endows the upper end of the PS/2 line—16-bit as well as 32-bit machines—with powerful new abilities that fundamentally alter the way that personal computers work, making them more like powerful mainframe computers. It is a completely integrated system, developed from the ground up for multitasking and ease of setup and operation, and it puts to rest a number of the nagging problems of the AT bus.

On the other hand, EISA elaborates on the AT approach. It extends the AT bus, adding the power to address more memory faster through a 32-bit data bus. In addition, it fills in the holes by adding features that weren't thought necessary when the AT bus premiered. These features are much the same as those of the Micro Channel—probably developed with the aid of prophetic hindsight—and include a new form of bus arbitration to facilitate multitasking and the setting up of expansion products.

The first machines to use the new EISA bus are not expected until late in 1989. One reason for this projected laggardly devel-

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CIRCLE 350 ON READER SERVICE CARD

## DIRECT MEMORY ACCESS: THE SECRET TO SPEED

Direct memory access relieves the microprocessor of some of its more tedious chores and speeds up bus operation. For example, DMA can shift bytes from a hard disk (where they are stored) through its controller into main memory, bypassing the CPU and saving time. Once it knows where the bytes are coming from and where they're going, the DMA controller takes command and does all the dirty work itself.

Of course, shifting the work to the DMA controller speeds up system operation only when the controller can move information faster than the microprocessor could. In a multiple-bus computer, data transfers and data processing can occur simultaneously, speeding up the operation of the system.

The top portion of the accompanying table ("Direct Memory Access: Comparing Transfer Rates") shows how DMA subsystems of personal computers have gone through a long evolution toward ever-greater speeds. The DMA controller in the original PC and XT moves information in byte-sized (8-bit) pieces. It operates at the same speed as the PC's microprocessor, 4.77 MHz, and each transfer of a byte under DMA control requires five cycles of the system clock, a total of 1,050 nanoseconds. The result (the reciprocal of the data cycle multiplied by 8) is a data transfer rate just under 1MB per second.

In the PC AT, two DMA controllers are used, and both operate somewhat more slowly than the one in the PC. Each chip operates at one-half the microprocessor speed (in a 6-MHz AT, the DMA controllers operate at 3 MHz). Because each DMA cycle requires five clock ticks, each takes 1,666 nanoseconds in a 6-MHz machine or 1,250 nanoseconds in an 8-MHz machine.

DMA in the AT can be quicker than in the PC because one of the DMA controllers moves information 16 bits at a time, double the capacity of the PC. In theory, the maximum DMA transfer rate of an

AT is thus about 1.6MB per second.

Unfortunately, few devices use the 16-bit DMA channels of the AT. The biggest reason for this is DOS, which makes no provision for properly aligning information for 16-bit transfers. Any operation dealing with DOS must run

through an 8-bit DMA channel.

To speed up DMA transfers in Micro Channel PS/2s, a special "burst" mode, which transfers entire blocks of data at one time, is provided. A few hundred nanoseconds are required before each burst to set up the entire transfer. There-



### Direct Memory Access: Comparing Transfer Rates

#### DMA speeds

Bus type	Width of data path	DMA cycle time (seconds)	Transfer rate (MB/second)
PC	8-bit	1.05	1.0
AT	16-bit	1.67	1.2
AT	16-bit	1.25	1.6
MCA	16-bit	0.40-0.60	3.0-5.0
EISA	32-bit Standard	1.00	4.0
EISA	32-bit Type A	0.75	5.3
EISA	32-bit Type B	0.50	6.0
EISA	32-bit Type C	0.12	33.0

#### Bus master speeds

Bus type	Width of data path	Bus speed (MHz)	Transfer rate (MB/second)
MCA	8-bit	10	10
MCA	16-bit	10	20
MCA	32-bit	10	40
EISA	8-bit	8	8
EISA	16-bit	8	16
EISA	32-bit	8	32*

\* A 25-MHz EISA machine might actually operate at a bus speed of 8.33 MHz, which would result in a 33MB/second maximum transfer rate.

after each DMA cycle requires 600 nanoseconds from system board memory or 500 from an expansion board on most Micro Channel PS/2s, and as little as 400 nanoseconds on faster 32-bit machines.

Current 32-bit PS/2s limit DMA transfers to 8 or 16 bits, and the design of the Micro Channel prevents IBM from expanding it to 32 bits, so the maximum Micro Channel data transfer speed is 5MB per second or about 2.5MB per second for 8-bit DOS operations.

**EISA BURST MODE** The EISA specification also allows for burst mode transfers. In addition, EISA is designed

■ The maximum speeds are irrelevant because they are achievable only on 32-bit DMA transfers, out of the range of DOS applications.

to operate DMA transfers at four different speeds, depending upon the capabilities of the device in use. The fastest of these speeds yields some formidable processing power.

For compatibility with AT devices, the default operation of the EISA DMA channels matches that of the AT, but the 32-bit-wide data path makes it four times faster. Three higher-speed modes are also allowed in the scheme. They've been assigned the names Type A, Type B, and Type C.

Normally a DMA transfer requires a minimum of two clock cycles because the controller must read an address on one cycle and write it on the next. The EISA system is able to beat this minimum during Type C transfers by operat-

ing in double time. Its transfers of bytes are keyed to both the leading and the trailing edge of the bus clock pulse, permitting the 2-byte transfers (from and to memory) to be processed within a single clock cycle.

The EISA specification includes DMA channels of 8-, 16-, and 32-bit widths; full 32-bit addressing allows the full physical memory of the 80386 microprocessor to be directly addressed by DMA. Using 32-bit transfers, theoretical DMA speeds ranging up to 33MB per second are claimed by EISA proponents, with calculations based on a 8.33-MHz bus clock. For now, these maximum speeds are irrelevant because they are achievable only on 32-bit DMA transfers, putting them out of the range of DOS applications, which, because of their 8-bit operation, slow the effective speed of the EISA DMA to one-quarter the fastest possible rate.

Moreover, most devices are expected to operate with Type B timing, according to Compaq. The maximum DMA rate of Type B transfers with 8-bit bus width is 2MB per second, effectively the same as that of most Micro Channel PS/2s. Certainly other issues are involved, but with DOS, EISA and MCA run in a dead heat. Therefore, drawing conclusions about which technology is better based on speed is at best a dicey proposition.

Though EISA looks faster in the top section of the table, another group of numbers shows MCA in the lead. This set of figures shows the theoretical data-transfer rates for both MCA and EISA when bus masters—devices that have the ability to transfer data without DMA or microprocessor intervention—are added to the system. Because the transfer rates in this case are a function of the bus speed (data path width divided by 8 and multiplied by the bus speed), the speedier 10-MHz Micro Channel bus yields potential transfer rates up to an impressive 40MB per second—faster than EISA's maximum of 32MB per second.

—Winn L. Rosch



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## ■ EISA VS. MCA

opment is that although many of the EISA functions will be built into high-level ASIC (application-specific integrated circuit) chips currently being developed by Intel, these chips are not scheduled to be in production until about the middle of next year.

**BUS ARBITRATION** Perhaps the most significant break that the Micro Channel makes with traditional PC design is in its hardware-mediated bus arbitration scheme. While the PC bus was created solely for handling the operation of a single microprocessor working on one job at a time—single tasking—Micro Channel PS/2s allow multiple microprocessors and ancillary devices to share the bus in an organized manner. This permits not only multitasking but also parallel processing, putting the high-end PS/2 on a par with minicomputers and mainframes.

The key words are *hardware mediated*.

The AT allowed bus sharing but required special software to control the system. All prioritizing had to be accomplished through programming, and little support

■ Any peripheral with a need to move information across the Micro Channel architecture bus quickly can take it over.

was given to the programmer. In Micro Channel architecture, special signals are used to grant control of the bus to any of several devices.

In the current line of PS/2s, the Micro

Channel circuitry allows up to eight microprocessors and eight other devices, such as DMA controllers, to share the data bus without interfering with one another and without requiring an elaborate software control system. The design of the hardware is flexible enough to accept a much larger number of bus-controlling devices. Any peripheral with a need to move information across the bus quickly can take it over. Coprocessors, advanced communications boards (micro-to-mainframe links and network adapters), and high-resolution graphics subsystems can all benefit from bus control. For proper operation, the Micro Channel bus arbitration scheme requires that all expansion cards carry its circuitry—even those that do not exploit bus arbitration to take control.

The Micro Channel accomplishes its bus arbitration task by specifying the hierarchy of signals that each device must use in order to gain access to the data bus.

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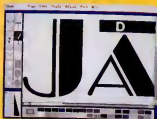
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## ■ EISA VS. MCA

Hardware arbitration prevents the confusion resulting from two devices trying to appropriate control of the Micro Channel at the same time. Four lines on the bus carry signals that code the level of priority assigned to each device that wants to take control of the Micro Channel; the various combinations of these four allow 16 levels of priority. Two additional levels of priority are used by the devices on the system board of the PS/2 and do not appear on the Micro Channel. Another two lines are used for requesting a change of control and granting the control.

The arbitration process begins when one or more devices want to take control of the Micro Channel and indicate their intention to the special circuitry that serves as the Central Arbitration Point (CAP). Once a pause appears on the data bus, the CAP orders all devices connected to the Micro Channel to bid for control. Each device then sends out its assigned priority level,

and each Micro Channel expansion card monitors the signals. If a card finds a signal with a higher priority than its own, it stops trying to control the bus.

**EISA ARBITRATION** EISA also uses a hardware arbitration scheme, but instead of using a bus and distributing the arbitration, EISA centralizes it in a special ASIC termed the Centralized Arbitration Control unit. Each priority level of the six arbitration levels supported by the announced EISA system has its own line to signal to the CAC unit when the associated device wants to take bus control. The CAC unit resolves any conflicts and then signals the device to which it has granted bus control.

In the EISA scheme, arbitration levels are fixed. Certain housekeeping functions—memory refresh and DMA, for example—get top priority. The next priority goes to the microprocessor. Finally, the six arbitration levels, in absolute fixed or-

der, are given the claim to bus access.

The extra control lines involved in the EISA scheme and the associated decoding and driver circuitry on each card make it more resistant to rapid change of its signals. The added overhead potentially limits the operating speed of the EISA bus. In fact, some board manufacturers who have seen the specs on EISA feel that the bus is too slow to be workable for high-speed, 32-bit memory expansion boards. EISA computer manufacturers may therefore have to continue making proprietary memory boards for their EISA PCs.

By comparison, the Micro Channel scheme is more flexible. Any arbitration level can be assigned to any device, with the exception that housekeeping functions retain top priority. While the default mode of operation of the Micro Channel gives the host microprocessor the lowest priority, it can be reprogrammed whenever necessary to have a priority higher than the bus

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## ■ EISA VS. MCA

arbitration levels as well.

According to Compaq, one advantage of EISA is that cache memory is regarded as an intrinsic part of the architecture. The cache allows the microprocessor to continue working even when another device has control of the bus. This true multitasking operation can deliver a tremendous performance increase on multitasking applications. Caching is not prohibited by the Micro Channel scheme, however, and since the 25-MHz IBM PS/2 Model 70-A21 currently implements a similar memory cache, the two architectures are equal in their caching capabilities. In bus arbitration, however, the more flexible, more expandable, and potentially faster Micro Channel holds a substantial edge.

**INTERESTING INTERRUPTS** One of the most important characteristics of today's PCs is that they are interrupt driven. Part of the system or a peripheral can send

the microprocessor a special signal—the interrupt—that causes the microprocessor to immediately turn its attention to the request behind the interrupt. After the micro-

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■ In bus arbitration, the more flexible and potentially faster Micro Channel holds a substantial edge.

---

processor takes care of the interrupt problem, it can then resume its normal work exactly where it left off. For instance, when a character shows up at a communications port, the microprocessor can pro-

cess the character as soon as it is notified by an interrupt rather than waiting a specific time or for the end of an executing program.

The PC and the AT use edge-triggered interrupts—that is, an interrupt defined by the beginning of a pulse. As long as every device has its own interrupt, this signaling method presents no problems. It's when interrupts are shared to stretch their always-too-meager supply that problems can arise. In the AT system, when one device issues an interrupt that is shared, the interrupt signal switches off all the other devices that share that same interrupt. The end of the interrupt routine causes the sharing devices to switch back on. A glitch on the interrupt line—noise—can cause all the devices to mistakenly switch off the line, and they are left in never-never land with no routine to bring them back.

To avoid this problem, interrupts on the Micro Channel were made level sensitive.

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### ■ EISA VS. MCA

The presence of a signal at a particular level indicates when the interrupt is being used. All devices sharing an interrupt know when it is active just by examining a level-sensitive interrupt line.

The EISA architecture acknowledges the superiority of the level-sensitive scheme while retaining compatibility with existing expansion boards that use edge-triggered interrupts. Under the EISA specification, each interrupt in an EISA computer will be individually programmable to be either edge triggered or level sensitive. Part of the configuration process for an add-in board indicates which type of signaling will be used for an interrupt.

This strategy has a problem, however. In the IBM scheme of things, edge-triggered and level-sensitive interrupts require an entirely different family of logic chips (on today's AT expansion boards, edge-triggered interrupts use bipolar logic; level-sensitive circuitry is based on special tri-state logic elements). Boards of the two types cannot be mixed on a single interrupt channel without unpredictable results. Plugging a board in indiscriminately may result in problems and failures. In this case, the disadvantage of the Micro Channel's incompatibility with existing AT boards becomes an advantage that prevents any such problem.

**INTEGRATING OPTIONS** Anyone tangling with a PC or AT expansion board knows what a nightmare the setup can be. Jumpers, DIP switches, and the like must be properly adjusted so that options do not conflict with one another. In addition, the hardware setup and software must match so that applications can locate the particular hardware features they require. Rarely do the setup instructions offered by board makers transcend inadequacy.

With the Micro Channel, IBM sought to minimize setup confusion with its Programmable Option Select (POS) feature. Using low-power, battery-backed-up CMOS memory much like what the AT uses for storing its disk drive types and memory endowment, POS allows each PS/2 to remember its own hardware configuration. It knows what cards and controllers it has and where everything is.

The facilities of POS allow the computer to know what board is located in each of

its expansion slots and how that board is supposed to function in relation to the rest of the system. Every different expansion board designed for the Micro Channel is assigned a unique identifying number that's coded into its firmware. When the computer boots up, the Micro Channel computer compares the installed options with its CMOS memory to detect changes and ensure the integrity of its setup.

### ■ IBM's scheme allows one seamless installation procedure that's consistent for any MCA board or option you want.

To read the identifying numbers of each option, the Micro Channel design allows individual cards to be enabled through a special control line. Instead of being bused together—that is, all the pins of the same number on each connector being linked—a separate line runs from each expansion slot to the Central Arbitration Point. Each card can thus be individually selected. The identifying numbers of each card are stored at the same location, and the system reads each slot individually. Boards can be put into any slot indiscriminately and still be properly read and identified.

The identifying numbers also serve to link each Micro Channel board to data files that contain information regarding the use and installation options of the expansion card. The IBM scheme allows setup files to be automatically incorporated into the official IBM setup procedure delivered on the system's reference disk. You see one seamless installation procedure that's consistent for any board or option you want to modify.

Although EISA similarly uses unique identifying numbers for each option, during boot-up it finds them in an entirely different manner. Each expansion slot is assigned a 4K range of addresses out of a possible 64K, and the slot itself supplies the first digit of the four used in the hexa-

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## ■ EISA VS. MCA

decimal identification of the ports assigned to that slot. For instance, slot 1 uses the addressing range 1000 through 1FFF (hex); slot 2, the range 2000 through 2FFF (hex). The identifying number of each expansion board is readable at I/O port xC80 (hex), with the x corresponding to the slot in which it is installed—for instance, 1C80 (hex) for slot 1. To read the identifying numbers of each option board, the system need only cycle through the identifying addresses for all its slots.

The scheme also ensures that the ports used by one expansion board will never conflict with those used by another. Each expansion board automatically gets its own 4K range of ports to use.

EISA also allows old-style boards with conventional DIP switch and jumper configurations to be used. Since these boards won't have the extra EISA connector, their ports will be decoded as part of the system board, which is assigned the range 0000 through 0FFF (hex).

Identifying numbers are set partly by the EISA organization and partly by the board maker. At the time an option-board maker signs up to use the EISA standard, it is assigned a unique three-character manufacturer code. This code serves as the prefix for all the identifying numbers of that company's products.

EISA also allows manufacturers the option of including configuration files with their products. These files can be used to determine the proper assignments of interrupts, DMA channels, and other resources or to instruct users how to adjust the switches and jumpers on the board.

The EISA scheme is ingenious, but the possibility exists that individual EISA expansion boards may not be able to address other expansion boards. Whether such problems exist will become apparent only when the EISA specification is finished or the first EISA computer is released.

**OTHER SIGNALS** The Micro Channel also offers several functions not defined in the original EISA specifications. These include options for music (or sound), video, and matched-memory cycles.

A special analog audio line is busied to each Micro Channel slot that allows integrating a single-channel medium-fidelity signal—synthesized voice or music, for

example—with the IBM bus structure. Audio quality is designed to be nearly as good as that of FM radio, with a frequency response of 50 to 10,000 Hz. The Micro Channel specification allows an analog noise level of up to 50 millivolts, against a maximum analog signal of 2,500 millivolts, an inauspicious signal-to-noise ratio of about 32 dB (compare that with the 54-dB signal-to-noise ratio of a good audio tape recorder). For most of today's applications, this audio channel is superfluous, but it may become valuable for advanced technologies such as voice recognition and synthesis.

IBM's VGA system has been incorporated as an extension to the basic Micro Channel architecture. A small auxiliary connector, generally only on one slot in each PS/2, allows expansion cards to directly access the digital-to-analog converter (DAC) that's built into the VGA circuitry of high-end PS/2s. This connector allows you to plug in a video coprocessor

## ■ IBM's VGA system has been incorporated as an extension to Micro Channel architecture.

card that will enhance the performance of the VGA but will still allow you to connect to your monitor through the video connector on the PS/2 chassis. Available on this bus extension are both horizontal and vertical synchronizing signals, eight data lines for driving the DAC, and even a signal that switches off the output of the internal VGA circuitry of the PS/2.

In the EISA system, these extra lines are unnecessary because all truly VGA-compatible display adapters have their functions on a special connector at the top of their boards. These auxiliary connectors are functionally an extension to the EISA specification.

In some 32-bit Micro Channel computers, another bus extension permits matched-memory data transfers. Matched memory allows the asynchronous Micro

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### ■ EISA VS. MCA

Channel to synchronize with the rest of the system so that bytes can be aligned and moved faster. In the 16-MHz 80386 PS/2 in which matched memory is currently implemented, the feature makes system memory respond as if it, too, were operating at 16 MHz. No corresponding feature exists in the EISA specification.

**FASTER, CLEANER SIGNALS** Perhaps the most important reason underlying the total redesign of the AT bus that resulted in Micro Channel architecture was the need to lower interference and increase speed. The original PC bus was designed for very modest operating frequencies, 4.77 MHz, and a limited signal bandwidth. No extraordinary measures were taken to shield it to prevent unwanted radiation emissions or to ensure its high-speed operation.

Micro Channel architecture, on the other hand, marks a quantum improvement over the PC bus design. The radically altered arrangement of signals on the Micro Channel puts an electrical ground on every fourth pin. The many grounds and their proximity to the high-frequency digital signals on the bus help reduce interference more than would be possible in PCs or ATs. That, in turn, makes achieving FCC certification less of a headache, giving designers one less thing to sit up nights worrying about. Estimates of outside laboratories put the maximum operating speed of the Micro Channel without worries of FCC problems as high as 80 MHz.

Even so, in current computers, the Micro Channel generally operates at a speed of 10 MHz. Its speed may vary, however, because the Micro Channel is designed specifically for asynchronous operation—that is, the bus speed and the clock speed of the microprocessor attached to it need not be related to each other.

When EISA was announced, the layout of its signals had not yet been completely defined. The bus frequency was defined at about the same as has been used in the AT, approximately 8 MHz. This part of the specification allows compatibility with any product that will work properly in an AT. As with the Micro Channel, the EISA bus can also operate asynchronously, but typically it won't. In 25-MHz computers, it is convenient to operate the bus synchro-

nously by dividing the system clock by three to produce a bus speed of 8.33 MHz.

Because it retains the same layout as the AT bus, EISA suffers all of the AT's problems in radiating interference as well as its lower maximum clock speed.

**PHYSICAL ISSUES** The most obvious differences between MCA and EISA are the physical aspects of the expansion cards and slots allowed under the standards (see "Board vs. Board: How EISA and MCA

■ The larger size of EISA boards has some advantages, including more room for circuitry and more power availability.

Measure Up"). Micro Channel add-in boards measure 3½ by 11½ inches, while EISA boards retain the 4¼- by 13½-inch dimensions of the AT format. The larger size of EISA boards has some advantages, including more room for circuitry and more power availability. The EISA bus is also backward compatible with AT and PC boards.

On the downside, the outrigger-style 32-bit connectors on EISA cards complicate the layout of the system board; they also move high-frequency signals away from the shielding provided by the boards, making interference more likely.

The Micro Channel uses smaller connectors than those of the aging PC and AT bus. That fact alone makes hardware meant for the PC bus incompatible with the Micro Channel, but the smaller Micro Channel boards do allow for compact computers (the PS/2 Models 50 and 70) that fit neatly on a desktop. Their new connectors also make it easier to engineer expansion boards based on surface mount components—miniaturized microchips that pack more functions into less space than ever before—because the pin spacing

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## ■ EISA VS. MCA

of the connectors matches that used by the tiny chips: increments of 0.050 inch.

**IS THERE A WINNER?** The nagging question is simple: Which is better? The answer is that the Micro Channel is the better architecture, simply because it starts where EISA leaves off.

This debate, however, is necessarily academic. The actual technical benefits and advantages of the two technologies won't be directly comparable until the first EISA computer rolls off the assembly line and into PC Labs sometime in late 1989.

Besides the unquantifiable technical differences, the differences between EISA and MCA occur in three areas: compatibility, freedom from licensing, and openness. The supposed advantages of EISA in these areas are elusive at best.

One of the goals of EISA is compatibility with existing AT boards. The quest for that compatibility results in the biggest

handicaps of the system, holding down its bus speed and aggravating its radio frequency emission. Worse, the compatibility-

■ **One goal of EISA is compatibility with AT boards. The quest for that compatibility results in the biggest handicaps of the system.**

ity of EISA probably won't be too valuable to you. You'll still be able to use the expansion cards you already own, but you'll have to buy a new computer to get EISA.

And you'll need to buy new expansion boards to take advantage of the features that make EISA better than the AT bus. The old AT-style boards you plug into the EISA bus will obliterate the speed advantage that you paid for. You won't want to pay the extra freight for EISA if you're not looking for its performance advantages.

While EISA promises freedom from the need to license, it does not deliver. IBM holds at least eight patents on technologies that are arguably infringed by every personal computer made. (U.S. patents numbers 3,812,475, 4,437,093, 4,460,957, 4,509,113, 4,570,161, 4,575,826, 4,580,135, and RE 32,201, the reissue of 4,408,200.) All eight of these patents were applied for before the announcement of the Micro Channel. How many Micro Channel patents are pending—and what they cover—won't be known until they are issued. It's impossible to guarantee that EISA won't infringe

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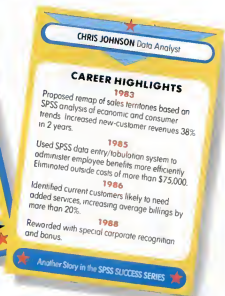


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## ■ EISA VS. MCA

on them, too. EISA machines may also infringe on patents owned by other organizations, and that's a bigger potential problem. While IBM has announced that it will license its technologies, another organization may not have such a policy. It could refuse to allow the EISA consortium to use its ideas. Makers of EISA computers won't be free from infringement worries.

In some ways EISA is more open than the Micro Channel. All of its features have been or will be documented all the way out to full 32-bit implementations with 32-bit DMA. The Micro Channel is unknown beyond its current implementation, which allows only 16-bit DMA and 16MB address-

■ **Micro Channel**  
architecture is unknown  
beyond its current  
implementation, which  
allows only 16-bit DMA  
and 16MB addressing.

ing. But the terms of EISA are hardly less forbidding than those of Micro Channel. As this article is written, obtaining whatever documentation is available for EISA requires the payment of \$2,500 to a Washington, D.C., law firm and the signing of a nondisclosure agreement that also requires sharing any innovations or developments with Compaq Computer Corp. In other words, EISA hardly falls within the public domain.

At best EISA is a bridge—a technology to serve between one standard and another—but it is a bridge of dubious value. On one side is the old AT bus. On the other is Micro Channel—or something like it. The real value of Micro Channel-style architecture exists, even if you can't see it with today's hardware and software. In the long run you'll be better off booking a direct trip rather than taking a detour.

Winn L. Rosch is a contributing editor of PC Magazine.

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# THE 80286 *UNSAFE AT HIGHER SPEEDS?*

The 286 is alive and well—  
and being pushed to 20 MHz. But  
watch out—386 performance  
comes at a price that may not  
be worth paying for 286 processing.

**O**ld microprocessors never die. They just get faster.

When 80386 technology debuted 2 years ago, almost everyone assumed that the 80286 chip, with its slower speed and comparatively limited powers, would recede quietly into insignificance. The 80386, after all, ran at 16 MHz and would soon run faster. The 80286-based computers were stalled at a top speed of 12 MHz. All indications were that 80286 machines would still be bought in large numbers but would be used primarily for undemanding tasks like text editing, where the computer spends a lot of its time waiting for the user to type a keystroke and only a little time doing anything complicated with the keystrokes it receives.

As anticipated, the 80386 immediately became the chip of choice for anyone interested in speed and efficiency. And 80386-based computers seized a larger share of the market than anyone had anticipated. Microsoft and IBM, after spending years designing OS/2 for 80286 machines, suddenly looked embarrassingly underdressed without a 386 operating system to wear to the party.

But the 80286 wasn't quite ready to lie down and play dead. Almost unnoticed, it suddenly picked up speed and roared back



into competition at 16 and then 20 MHz. And whispers of even greater speeds began to be heard. The competition between the 286 and the 386 wasn't merely technological. On the public-relations front, vendors of 80286 machines started firing off position papers and technical memos claiming that the 80286 was actually a faster and better chip than the 80386. (See the sidebar "The 80286: Running on Empty?") At least that's what they seem to claim until you notice the qualifications in the fine print.

**THE 286 TRIES HARDER** This public-relations battle was fueled by strong economic motives. When Intel Corp. designed the 80286 processor, it licensed other manufacturers to produce the same chip using their own manufacturing methods. Intel's licensees included AMD (Advanced Micro Devices) and Harris Semiconductor. When Intel designed the 80386, it decided not to let any other manufacturer in on the act, so the most advanced Intel-designed processor that AMD and Harris can produce is the 80286. That means it is safe to assume that neither of the two vendors wants to see the 80286 market dry up.

A 20-MHz 80286 machine will certainly perform faster than a 16-MHz 80386 machine and will probably cost a few hundred dollars less. Whether that makes the 286 machine a more desirable purchase is a moot question. A fast 286 isn't a cheap commodity item like an 8088 machine. If you buy one now, you probably expect to use it for a few years. But keep in mind that it won't be long before a large number of applications that require an 80386 appear.

The 80286 vendors, however, claim that few applications now make use of the 386, and that OS/2 in its present form is designed to work perfectly well with the 286. This claim is valid, as far as it goes. The only relatively popular 386 application available now is *Windows/386*. But that doesn't mean you can't take advantage of the 386 in other ways. 80386 memory managers like Qualitas's *386-to-the-Max* and Quarterdeck's *QEMM-386* let you install memory-resident programs in high memory out of DOS's way. This means that you get more memory for your application programs and that those programs

have to make fewer disk reads and writes than they would on an 80286 machine. This difference alone gives the 386 a significant real-world advantage right now.

Whatever the merits of the public-relations case, there's no question that Intel's licensees have performed dazzling technical feats in bringing the 286 up to speed. Harris redesigned the entire 80286 as a

■ We raised our eyebrows at the sight of 16-MHz chips in 20-MHz machines. Vendors claim most of Harris's 16-MHz chips operate safely at the higher speed.

CMOS (complementary metal-oxide semiconductor) chip, which means that it needs less power and generates less heat than Intel's blend of older HMOS (high-speed metal-oxide silicon) and CMOS technology. Because it generates less heat, Harris's chip can run at much greater speeds than Intel's—without producing a motherboard meltdown.

All the manufacturers of 20-MHz 80286 computers use Harris chips—or virtually all. Dell Computers won't say which vendor it gets its chips from, and the processor in the Dell machine we tested has Dell's name silk-screened over the original manufacturer's.

**PROCESSOR SPEED** The speed of these computers is a more complex issue than it would seem. Processing speed is set by a "clock" on the motherboard. All these 20-MHz machines have clocks running at 20 MHz—although most of the machines we tested used processors rated to perform at only 16 MHz. The clock speed is always a fraction of the speed of a crystal oscillator on the motherboard. In these machines the oscillator itself runs at 40 MHz, and the machine divides that fig-

ure by two for 20-MHz operation or by four for 10-MHz operation when both slow and "turbo" speeds are available.

A microprocessor rated at 16 MHz is made in the same way as one rated at 20 MHz. A "faster" microprocessor is one that passes tests at a higher speed. When some of these computers arrived in PC Labs, we raised our eyebrows at the sight of 16-MHz chips in 20-MHz machines. Our eyebrows ascended even higher when we saw that the speed rating on the VLSI (very large scale integration) chip set in one of the machines had been erased.

But the vendors claimed that most of Harris's 16-MHz chips operate safely at the higher speed and that Harris has only recently begun to certify any chips as specifically rated at 20 MHz. All the vendors reported that they tested and guaranteed the 16-MHz chips for 20-MHz operation, and all said they would ship their computers with Harris-certified 20-MHz chips by the time this issue hits the newsstand. (Once again the exception was Dell Computers, which won't say where its chips come from but guarantees that they'll operate at 20 MHz.) We rode all these machines very hard in our benchmark testing, and all of them performed without any problems at 20 MHz, so we're inclined to believe the vendors' claims.

**BUSSPEED** The speed at which a computer's expansion bus operates—the speed at which it transfers data to and from its I/O cards, video cards, and memory boards—is a completely different issue. On AT-class computers, separate oscillators control the bus and the processor.

Like most fast computers that use AT-style expansion buses (including 80386 machines), these 20-MHz models typically use bus speeds of 8 or 10 MHz. This means that any memory on an expansion board is too slow to respond to the processor at the speed at which the processor requests a memory access, and therefore the machine has to insert wait states—additional clock cycles—into all memory accesses in order to avoid errors. Some of these machines have special memory-board slots that allow memory accesses at the same high speed as the memory installed directly on the motherboard.

Memory installed on the motherboard

## THE 80286: RUNNING ON EMPTY?

If it could speak, the 80286 microprocessor might use its silicon voice to echo the words of Mark Twain: "The reports of my death are greatly exaggerated." Although some people see it as a processor on the verge of extinction, the 80286 continues to improve in performance, and computers based on this chip continue to enjoy healthy sales.

The latest crop of 80286 processors races along at a speed of 20 MHz. For a processor that is supposedly on its last legs, that's pretty fast. And would you be surprised to see the 80286 revved up to run at 40 MHz sometime in the future?

While Intel Corp., which originally designed the 80286, is content to let its version plod along at 12.5 MHz, other companies, namely Harris Semiconductor (Melbourne, Florida) and Advanced Micro Devices, or AMD (Sunnyvale, California), have decided to supercharge the chip.

Why does the 80286 keep getting faster? And what are its upper limits, if any? The main reason for the increased speed of the 80286 is CMOS (complementary metal-oxide semiconductor) technology. One of the benefits of CMOS is its low power consumption. Low power consumption translates into cooler operation; hence, the ability to run faster without

overheating. In the past, chips would first be constructed with either bipolar or NMOS (N for N-channel) technologies. Then, almost as an afterthought, a low-power CMOS version of the chip would be designed. However, as the number of transistors integrated on a single chip increased, both bipolar and NMOS began to have heat dissipation problems. This barrier has led some chip manufacturers to turn to CMOS as the semiconductor technology of choice.

The success that chip manufacturers have enjoyed in squeezing more and more transistors onto a chip has also helped to increase the speed of the 80286. Chips manufactured at Harris today use what engineers call 1.5-micron geometries. As the transistors on a chip shrink in size, the pathways or wires between them become shorter. And as distance decreases, speed increases. Future advances in lithography—the way the design of the chip is etched onto the silicon—and in other aspects of the manufacturing process promise to bring CMOS technology down to 1.0 or even submicron geometries, further enhancing speed.

Miniaturization is not the only problem, however. Problems also exist in moving the signals into and out of the

chip package and along the computer's system board. So for chips to perform at ever-increasing speeds, advances are also needed in packaging and interconnection schemes.

It's only a matter of time before you'll see faster versions of the 80286 appear. It is fairly certain that a 25-MHz 80286 will be available in 1989. In fact, some of the 80286 chips rated at 20 MHz are probably capable of running at 25 MHz right now. Why? It's because the rating of a particular processor is the speed at which it is *guaranteed* to run reliably. But some 20-MHz chips will perform well beyond their rating.

Will we see a 40-MHz 80286 by 1990? Possibly, though some engineers think that the architecture of the chip will limit its speed to a number somewhat below that—perhaps to 33 MHz. Will the chip still be around at that time? It's easy to say that the 80286 will be a technological dinosaur by the 1990s. But when you consider that the industry has yet to purge itself of the far less capable 8088 microprocessor, it makes you wonder what it will take to kill off the 80286, or even to slow it down. —Joe Desposito

*Joe Desposito is senior project leader of PC Labs.*

requires fewer wait states than the memory installed on an expansion board, but it still needs *some*, mostly because the memory chips are unable to refresh themselves quickly enough to keep pace with the processor. By interleaving different banks of memory—so that one bank of memory is refreshing itself while the other is being accessed by the processor—some of these computers can reduce the number of wait states to a figure approaching zero.

All of these machines have sockets for coprocessors and can use 80287 chips rated at 10 MHz.

The six machines included in this roundup are not your only options if you're searching for a 20-MHz 80286 computer. Imperial Computer Corp., Wells Ameri-

can, and Astrid, a division of Trillion Computer Corp., all manufacture 20-MHz 286-based PCs, but these were unavailable for testing at the time of this review.

**TRADITIONAL DESIGN** Except for their speed, most of the computers reviewed are standard AT-class machines with some advanced hardware frills like interleaved memory and special slots for high-speed memory boards. You won't find any backplane designs, or any designs that accept Micro Channel expansion boards. These machines tend to sport traditional designs, and considering the demands that high speed makes on their various components, their traditional design probably makes them more reliable than

more-experimental designs.

That's not to suggest that you won't find variety here. Dell Computer, for example, sent us its miniature 80286-in-a-Model-30-box with just about everything built into the motherboard. Northgate sent us a preliminary version of a machine with all-dressed-up-and-fit-to-kill hardware like an SCSI hard disk.

If we were to say that you won't find any big surprises here, we would be ignoring the biggest surprise of all: a whole family of 80286 computers—some of them at a price well below \$2,000—running more than three times as fast as IBM's original AT. Not long ago, these new-ordinary-looking machines would have been all but unimaginable.

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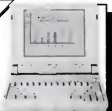
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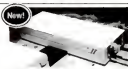
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## ■ 20-MHz 286-BASED PCs

### DATAWORLD INC.

## Dataworld Data 286-20

If you decide that the Dataworld Data 286-20 is the machine for you, don't think you're finished making decisions. Dataworld lets you choose virtually everything about your machine—right down to the degree of stylishness in the appearance of the front panel.

Whichever options you choose, Dataworld's entry in the 20-MHz 286 sweepstakes is a solidly built system with excellent workmanship. Its performance is at the low end of the scale for this class of machine, but the difference between the low and high end in this group isn't very large. Except for the special expansion slot on the motherboard for a forthcoming high-speed memory card, all varieties of the Dataworld computer perform very much like an AT clone that happens to run two and a half times faster than the IBM PC AT.

Without a hard disk, a typical Data 286-20 configuration costs only \$1,555. For this price you get 1MB RAM, a 1.2MB floppy disk drive and controller, a 1:1-interleave Western Digital hard-disk controller, a Hercules-compatible monochrome



*The least expensive machine in this roundup, the Dataworld Data 286-20 sells for \$1,938 with 1MB RAM, a 32MB hard disk, and a monochrome display. One of the machine's two 8-bit slots has an additional connector designed for a proprietary high-speed memory board that is not yet available.*

card, and a Samsung monochrome monitor. The excellent 101-key IBM Enhanced-style keyboard sports a hinged plastic cover, has a full-size Backspace key, and responds to your keystrokes with a clicky, positive feel. All the usual suspects are available as optional upgrades, including a second MB of RAM for \$450, a 20MB or 40MB hard disk, a 40MB tape backup unit, and an ATI 8-bit VGA card.

Starting from the outside, Dataworld lets you choose between two case designs. One has a stark but stylish front panel, the other (as tested) is a rugged-looking box with a pattern of horizontal striations. Both have a reset switch and keylock on a panel in the front. The patterned model also has a turbo switch while the starker one doesn't; but this may actually be in the stark model's favor because nothing happens when you press the turbo switch—it isn't attached to anything. Although the Dataworld system lets you change speeds from 10 MHz to 20 MHz and back, you can accomplish this only by pressing the combinations of Ctrl-Alt-Keypad Plus or Ctrl-Alt-Keypad Minus.

Dataworld offers a choice of two different disk controller configurations, both of which were sent for review. The first unit contained a Western Digital WD1006-WAH hard disk controller and a separate

no-name floppy controller suitable for 1.2MB and 1.44MB drives. The hard disk controller didn't work, so Dataworld replaced the machine with one having the configuration it now recommends: a combined Data Technology hard-and-floppy disk controller. This worked perfectly. Disk performance with the supplied 40MB Seagate drive was at the slower end of the scale, but the difference between Dataworld's disk and most of the competition's was too small to be significant. The floppy drive installed in the system was TEAC's reliable, quiet 1.2MB model.

Our sample machines each came with a Harris 16-MHz 80286. According to Dataworld, the Data 286-20 will be using Harris chips rated at 20 MHz by the end of 1988. The chip set is by Chips and Technologies, and the BIOS is Award's familiar and reliable version. You can use a built-in setup menu to change bus speeds from 8 MHz to 12 MHz.

Dataworld's motherboard has two 8-bit and six 16-bit slots. One of the 8-bit slots has an additional connector designed for a proprietary high-speed memory board that won't be limited by the bus speed. This board isn't available yet, and no definite date has been set for its arrival. Meanwhile, you can expand the 1MB of 100-nanosecond motherboard DRAM to 2MB



## FACT FILE

### Dataworld Data 286-20

Dataworld Inc.  
3733 San Gabriel River Pkwy.  
Pico Rivera, CA 90660  
(800) 722-7702  
(213) 695-3777

**List Price:** With 1MB RAM, 1.2MB 5¼-inch floppy disk drive, \$1,492; with a 12-inch Samsung monochrome monitor, \$1,555. 1MB RAM upgrade, \$450; 20MB hard disk, \$275; 40MB hard disk, \$410; 40MB tape backup, \$420; 1.44MB 3½-inch floppy disk drive, \$125; EGA card and monitor, \$460; VGA card and NEC Multisync II monitor, \$305; 100-card with 1 parallel and 2 serial ports, \$59; 80287-16 moth coprocessor, \$320.

**In Short:** A solid machine with fine workmanship, careful attention to detail, and all the options you can imagine. Performance was on the low end of a narrow scale. Essentially a highly compatible, very fast AT with a slot for a high-speed memory board.

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<b>Application Techniques ... NCP</b>	
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□ Framework III 1.0	459.
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■ AutoSketch Standard 1.04	55.
■ AutoSketch Speed Enhanced 1.04	65.
<b>Barron's ... CP</b>	
■ SAT (test preparation program)	35.
<b>Best Programs ... NCP</b>	
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□ Report Manager 5.0	199.
□ Fixed Asset System 5.0	359.
<b>Bible Research ... NCP</b>	
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□ The Word 4.2 (New International version)	159.
<b>Bloc Publishing ... NCP</b>	
□ FormTool 2.01	55.
<b>Borland International ... NCP</b>	
□ Turbo C Professional Pack (includes assembler)	169.
□ Turbo Pascal Professional Pack (includes assembler)	189.
□ Paradox OS/2 1.0 (3 1/2" only)	479.

## PC Connection Software Special through December 31, 1988

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Both programs support CGA, EGA, and Hercules monochrome graphics cards, and are installed easily on floppy or hard drive systems with menu-driven commands. Educational preview disk included with purchase.

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□ FastTrax 3.9	35.
<b>Broderbund ... CP</b>	
□ Print Shop 2.41 (includes Graphics Library 1)	39.
□ Memory Mate 3.01 (NCP)	45.
<b>Chipsoft ... NCP</b>	
■ TurboTax Personal/1040 6.0	45.
■ State Packages Personal/1040 6.0	each 29.

■ TurboTax Proseries/1040 5.0	\$ 229.
■ Tally Ho (financial calculator)	32.
<b>Chronos Software ... NCP</b>	
■ Who+What+When (people, projects, time)	119.
<b>Computer Associates ... NCP</b>	
■ SuperCalc 5.1.0	319.
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□ Powerbase 2.3	189.
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<b>Crostalk Communications ... NCP</b>	
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<b>Funk Software ... NCP</b>	
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□ Genac CADD Level 1	35.
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❑ Grammatik III 1.05 (electronic proofreader)	52.
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Q&A Network Pak 1.0 (requires Q&A)	179

<b>T/Maker ... NCP</b>	
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<b>True Basic Libraries</b>	32
<b>Vericomp ... NCP</b>	
SoftBytes 2.0	35
SoftBytes 386 2.53	49

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WordPerfect 5.0	255

WordPerfect 5.0 Add'l 1 Network Stations	84
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WordPerfect Network Server 5.0	349
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<b>Wordtech ... NCP</b>	
DBXL 1.2	119
<b>Xerox ... NCP</b>	
Ventura Publisher 2.0	549

<b>XyQuest ... NCP</b>	
XyWrite III Plus 3.54 w/A-1a-Card Menu	239

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Hardball (baseball simulation)	11

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Where in Europe is Carmen San Diego?	29

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Ultima IV	35
Ultima V	39

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Chessmaster 2000	32
Earl Weaver Baseball	32
Empire	35

Mavis Beacon Teaches Typing	35
Sentinel Worlds	49
Grand Slam Bridge	35

<b>Infocom ... NCP</b>	
Zork Trilogy	33
<b>Lifestyle Publishing Group ... NCP</b>	
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Micro Video Companion	24
Take Control of Cholesterol	24

<b>Microprose ... CP</b>	
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F-15 Strike Eagle (requires CGA)	22
Gunship (requires CGA or EGA)	32

<b>Microsoft ... NCP</b>	
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<b>Parlor Software ... CP</b>	
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<b>Sierra On-Line ... CP</b>	
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Space Quest II	33

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Police Quest	33
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Thexder	24
3D Helicopter	24

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<b>Sphere, Inc. ... NCP</b>	

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GATO (submarine simulation)	12
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Sargon III (chess game)	15
Kids on Keys (ages 3 to 9)	19

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Kindercomp Gold (ages 3 to 8)	25
SAT Preparation Program	25

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<b>Stone &amp; Assoc. ... NCP (reqs. graph. brd.)</b>	
Algebra Plus (ages 13 to adult)	27
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<b>The Learning Company ... CP</b>	
Math Rabbit (ages 4 to 7)	26
Reader Rabbit (ages 4 to 7)	26
Writer Rabbit (ages 6 to 12)	26

<b>XOR ... NCP</b>	
NFL Challenge 2.0	69

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IO Mini 2 C/SIP ...	89.
SoPeekPlus 64k C/SIP (upgrades to 576k) ...	129.
Advantage Premium 512k S/P (upgrades to 1 Meg or 2 Meg w/Piggyback) ...	call
Advantage 2 512k (for PS/2 Model 80) ...	call
Advantage 2-386 (for PS/2 Model 80) ...	call
RAMPAGE Plus 286 512k (for XT286/AT) ...	call
RAMPAGE! Plus MicroChannel 512k (for PS/2 Models 50/60) ...	call
<b>Amdek</b> ... 90 days	
LaserDrive-1 (external CD-ROM Drive) ...	629.
LaserDrive-1 (internal CD-ROM Drive) ...	629.
<b>Compucable</b> ... 2 years	
2-Position switch box ...	29.
3-Position switch box ...	39.
<b>Cuesta</b> ... 1 year	
Datasaver 400 Watt (standby power backup unit) ...	459.
<b>Curtis</b> ... lifetime	
<b>ACCESSORIES</b>	
Curtis Clip CC-1 ...	6.
Disk Holder DB-1 (holds 50 5 1/4" disks) ...	8.
3 1/2" Disk Holder DB-2 (holds up to 40 disks) ...	8.
3 1/2" Diskette Cleaning Kit CK-2 ...	18.
Printer Stand PS-1 ...	18.
Universal System Stand SS-3 ...	25.
Static Mat SM-2 ...	25.
Toolkit TK-1 ...	25.
DS-1 Switch Box (controls 2 printers) ...	33.
<b>CABLES</b>	
Smartmodem-to-PC Cable EC-7 (9 feet) ...	17.
Printer-to-IBM cable EC-6 (9 feet) ...	17.
PS/2 Keyboard Extension Cable EC-9 ...	25.
Keyboard Extension Cable EC-2 ...	25.
<b>SURGE SUPPRESSORS</b>	
Safestrip SP-3 (6 outlets; 1 year warranty) ...	19.
Filtered Safestrip SPF-3 ...	21.
Diamond SP-1 (6 outlets) ...	29.
Emerald SP-2 ...	36.
Diamond Plus SP-1 Plus ...	41.
Sapphire SPF-1 ...	45.
Ruby SPF-2 (6 outlets; EMV/RFI filtered; 8 ft cord) ...	55.
Ruby-Plus SPF-2 Plus (w/FAX & modem protection) ...	69.

## PC Connection Hardware Special

through December 31, 1988

### Practical Peripherals ... 5 years 2400 Baud Internal & External Modems

The Practical Peripherals 2400 SA has been a best-seller with us for some time now. The reason? It delivers high quality data transmission, Hayes compatibility, and made-in-the-USA quality. All at a terrific price.

- Hayes asynchronous compatible
- Compatible with virtually all current communications programs
- Separate line and set connectors to accommodate data and voice calls
- Automatic answer mode
- Made in the U.S.A.
- Full 5 year warranty

2400 SA (external modem) ... \$181.  
PM2400 (internal modem w/ProComm) 151.

### DCA ... 1 year

Irma 2 (3270 emulation board) ... 729.

Irma 2 Micro Channel (for PS/2 Models 50/60/70/80) ... 729.

### Epson ... 1 year

We are an authorized Epson Service Center

FX-850 (80 col., 264 cps, 9 pin) ... call

FX-1050 (136 col., 264 cps, 9 pin) ... call

LQ-500 (80 col., 180 cps, 24 pin) ... call

LQ-850 printer (80 col., 264 cps, 24 pin) ... call

LQ-1050 printer (136 col., 264 cps, 24 pin) ... call

LQ-2550 printer (136 col., 400 cps, 24 pin) ... call

LX-800 printer (80 col., 180 cps, 9 pin) ... call

Printer-to-IBM cable (6 feet) ... 15.

### Everex ... 1 year

1200 Baud Internal Modem ... 79.

2400 Baud Internal Modem ... 149.

### 5th Generation ... 1 year

Logical Connection 256k ... 479.

Logical Connection 512k ... 539.

### Hayes ... 2 years

Smartmodem 1200 ... 299.

**1-800/243-8088**



PC Connection

6 Mill Street

Marlow, NH 03456

603/446-3383 FAX 603/446-7791

Smartmodem 1200B (with Smartcom II) ... \$299  
Smartmodem 1200B (hardware only) ... 265.  
Smartmodem 2400 ... 449.  
Smartmodem 2400B (with Smartcom II) ... 449.

### Hercules ... 2 years

Graphics Card Plus ... 189

Network Card Plus (with TOPS DOS) ... 339

Incolor Card ... 229.

### Intel ... 5 years

2400B Modem 2 (internal modem for PS/2 Models 50/60/80) ... 269.

Inboard 386/PC w/1 Meg ... 799.

Inboard 386/AT 6k (req. installation kit) ... 899.

Inboard Installation Kit (specify computer) ... 139

Above Board 286 512k ... 379.

Above Board PS/286 512k S/P ... 419.

Above Board Plus 512k ... 429.

Above Board 2 Plus 512k ... 479.

Above Board Plus IO 512k ... 529.

Connection Coprocessor (FAX board optional) ... 769.

Plus) 2400 Baud Modem for Connection Coprocessor ... 229.

### MATH COPROCESSORS

8087 (for IBM-PC & XT) ... 105.

8087-2 (8 MHz; for PS/2 Models 25 & 30) ... 149.

80287 (for AT & XT286) ... 165.

80287-8 (for 8 MHz 80286 machines) ... 239.

80287-10 (for PS/2 Models 50 & 60) ... 279.

80387 (for 16 MHz PS/2 Model 60) ... 439.

80387-20 (for 20 MHz PS/2 Model 80) ... 499.

### Kenelington Microware ... 1 year

Masterpiece (with \$15 rebate thru Dec.) ... 94.

Masterpiece Plus (with \$15 rebate thru Dec.) ... 109.

### keytronic ... 3 years

101 Plus Keyboard (enhanced layout) ... 99.

### Kraft ... 1 year

Three-button Joystick ... 33.

High Speed Joystick Adapter Card ... 25.

### KYE International ... lifetime

Dyna Mouse GM-6 Plus (w/Dx Halo II) ... 54.

### Logitech ... lifetime

Series 2 Mouse (for PS/2 50/60/70/80) ... 65.

HIREZ Mouse (bus only) ... 89.

Mouse w/Print Show (bus or serial) ... 95.

Mouse w/LogiCAD (bus or serial) ... 119.

ClearCase Mouse (serial only) ... 99.

ScanMan (hand held scanner) ... 199.

### Microsoft ... lifetime

Mouse ... 349.

Disk + Option (for Mach 20) ... 89.

Memory + Option (for Mach 20) ... 339.

Mouse with Paintbrush (bus or serial) ... 109.

Mouse with EasyCAD (bus or serial) ... 125.

Mouse with Windows/286 (bus or serial) ... 145.

### Milgent ... 1 year

Pocket Modem (1200 baud, incl. software) ... 109.

For IBM Personal Computers exclusively.

**PC CONNECTION®**

\*DEFECTIVE SOFTWARE REPLACED IMMEDIATELY DEFECTIVE HARDWARE REPLACED OR REPAIRED AT OUR DISCRETION

# Jingle bells, give us a yell,

## PC Connection knows the way.

### We hope you have a great New Year and happy holidays.

#### MSC Technologies ... lifetime

OmniMouse w/Designer Pop-up menus (serial only; 1 year warranty) .....	\$57.
PC Mouse II w/PC Paint+ (bus or serial) .....	89.
PC Mouse II w/AutoSketch (bus or serial) .....	105.

#### NEC ... 2 years

Multisync Plus (960 x 720 max. resolution) .....	949.
Multisync II (800 x 560 max. resolution) .....	call

#### NSI Logic ... 3 years

Smart VGA (supports full VGA specs) .....	229.
-------------------------------------------	------

#### Orchid Technologies ... 2 years

RAMquest Xtra 0k (for PS/2 50/60/70/80) .....	379.
Tiny Turbo 286 (accelerator board) .....	289.

#### Designer VGA

Designer VGA .....	349.
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#### Ramquest 2 1 Meg (for PS/2 50/60)

Ramquest 2 1 Meg (for PS/2 50/60) .....	549.
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#### PC Power & Cooling Systems ... 1 year

REPLACEMENT POWER SUPPLIES	
Turbo Cool 150 (run 25" - 40" cooler) .....	129.
Turbo Cool 250 (run 25" - 30" cooler) .....	169.

#### Silencer 150 (84% noise reduction)

Silencer 150 (84% noise reduction) .....	115.
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#### Silencer 200 (69% noise reduction)

Silencer 200 (69% noise reduction) .....	149.
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#### PC Support Group ... 1 year

Breathrough 286 Accol. Board (8 MHz) .....	299.
Breathrough 286 Accol. Board (12 MHz) .....	449.

#### Practical Peripherals ... 5 years

1200 Baud Internal Modem (w/ProComm) .....	69.
1200 Baud External Modem (mini) .....	79.

#### PLink (parallel line extender/32k)

PLink (parallel line extender/32k) .....	109.
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#### Microbiller Inline (per. print buffer/32k)

Microbiller Inline (per. print buffer/32k) .....	135.
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#### 2400 Baud External Modem ... special

2400 Baud External Modem .....	special
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#### Princeton Graphics ... 1 year

UltraSync (supports CGA, EGA, VGA) .....	549.
Max 15 Amber Monochrome Monitor .....	269.

#### Safe Power Systems ... 2 years

Safe 250W (standby power backup) .....	249.
Safe 425W (standby power backup) .....	369.

#### Toshiba ... 1 year

P321SL printer (80 col., 216 cps, w/tractor) .....	529.
P351SX Printer (132 col., 360 cps) .....	999.

#### T1000 Laptop (80C86, 6.4 lbs., 5 hr. battery) call

T1200 Laptop (80C86, 10 MHz, 20 Meg) .....	call
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#### T1200HB Laptop w/Backlit screen .....

T1200HB Laptop w/Backlit screen .....	call
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#### T1200F Laptop Dual Floppy System .....

T1200F Laptop Dual Floppy System .....	call
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#### T1200FB Laptop Dual Floppy System w/Backlit screen .....

T1200FB Laptop Dual Floppy System w/Backlit screen .....	call
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#### T3100/20 Laptop (80286, 8 MHz, 20 Meg) .....

T3100/20 Laptop (80286, 8 MHz, 20 Meg) .....	call
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#### T3200 Laptop (80286, 12 MHz, 40 Meg) .....

T3200 Laptop (80286, 12 MHz, 40 Meg) .....	call
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#### T5100 (80386, 16 MHz, 40 Meg) .....

T5100 (80386, 16 MHz, 40 Meg) .....	369.
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#### External 5 1/4" Drive for Laptops .....

External 5 1/4" Drive for Laptops .....	299.
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#### 788k RAM Card for T1000 .....

788k RAM Card for T1000 .....	499.
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#### Video 7 ... 5 years

VEGA Deluxe (supports 640x480) .....	219.
VEGA VGA (supports full VGA specs) .....	287.
FastWrite VGA .....	399.
VRAM VGA .....	529.

#### DRIVES

##### IOMEGA ... 1 year

Dual 20 Meg Bernoulli Box (8") .....	\$1679.
20 Meg Cartridge (8") .....	82.

##### 20 Meg Tripak (8") .....

20 Meg Tripak (8") .....	244.
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##### Bernoulli II Single 20 Meg Internal (5 1/4") .....

Bernoulli II Single 20 Meg Internal (5 1/4") .....	767.
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##### Bernoulli II Dual 20 Meg External (5 1/4") .....

Bernoulli II Dual 20 Meg External (5 1/4") .....	1659.
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##### 20 Meg cartridge (5 1/4") .....

20 Meg cartridge (5 1/4") .....	59.
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##### 20 Meg Tripak (5 1/4") .....

20 Meg Tripak (5 1/4") .....	169.
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##### PC2B Card (bootable card for PC/XT/AT) .....

PC2B Card (bootable card for PC/XT/AT) .....	229.
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##### PC4 Card (for PS/2 Model 50/60/70/80) .....

PC4 Card (for PS/2 Model 50/60/70/80) .....	299.
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##### Mountain Computer ... 1 year

40 Meg Internal Tape Drive (XT, AT or PS/2) 379.	
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##### 40 Meg External Tape Drive (XT, AT or PS/2) .....

40 Meg External Tape Drive (XT, AT or PS/2) .....	479.
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##### 40 Meg External Tape Drive w/Power Supply (XT, AT, or PS/2) .....

40 Meg External Tape Drive w/Power Supply (XT, AT, or PS/2) .....	569.
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##### Plus Development ... 1 year

Hardcard 20 Meg (49 ms) .....	549.
Hardcard 40 Meg (28 ms) .....	699.

##### Passport (20 or 40 Meg removable drives) .....

Passport (20 or 40 Meg removable drives) .....	call
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##### Seagate ... 1 year

FREE PCTV® Hard Drive Installation Tape with the purchase of 20, 30 or 40 Meg Seagate drive for the IBM PC (not for AT). Specify Beta or VHS.	
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##### 20 Meg Internal Hard Drive ST225 (w/controller and cables, 65 ms) .....

20 Meg Internal Hard Drive ST225 (w/controller and cables, 65 ms) .....	299.
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##### 30 Meg Internal Hard Drive ST238 (w/controller and cables, 65 ms) .....

30 Meg Internal Hard Drive ST238 (w/controller and cables, 65 ms) .....	329.
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##### 40 Meg Internal Hard Drive for AT (40 ms) .....

40 Meg Internal Hard Drive for AT (40 ms) .....	399.
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##### 40 Meg Internal Hard Drive for XT (w/controller and cables, 40 ms) .....

40 Meg Internal Hard Drive for XT (w/controller and cables, 40 ms) .....	469.
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##### 40 Meg Internal HD ST251-1 for AT (28 ms) .....

40 Meg Internal HD ST251-1 for AT (28 ms) .....	469.
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##### 80 Meg Internal HD ST4096 for AT (28 ms) .....

80 Meg Internal HD ST4096 for AT (28 ms) .....	689.
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##### TEAC ... 1 year

AT 360k Drive (5 1/4" half-height) .....	89.
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##### 720k Drive (3 1/2" half-height, specify XT or AT) .....

720k Drive (3 1/2" half-height, specify XT or AT) .....	95.
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##### 1.44 Meg Drive for AT (3 1/2" half-height, includes Bastech software utilities) .....

1.44 Meg Drive for AT (3 1/2" half-height, includes Bastech software utilities) .....	125.
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##### Toshiba ... 1 year

AT 360k Drive (5 1/4" half-height) .....	89.
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##### AT 1.2 Meg Drive (5 1/4" half-height) .....

AT 1.2 Meg Drive (5 1/4" half-height) .....	99.
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#### DISKS

##### All disks have a lifetime warranty.

##### 5 1/4" DS/DD Disks for PC & XT (360k)

Fuji MD2D (10 disks per box) .....	12.
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##### Sony (10 disks per box) .....

Sony (10 disks per box) .....	12.
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##### Maxell MD2-D (10 disks per box) .....

Maxell MD2-D (10 disks per box) .....	13.
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##### Verbatim DataLife (10 disks per box) .....

Verbatim DataLife (10 disks per box) .....	13.
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##### 5 1/4" DS/High Density Disks for AT (1.2 Meg)

Fuji MD2HD (10 disks per box) .....	\$22.
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##### Sony (10 disks per box) .....

Sony (10 disks per box) .....	23.
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##### Maxell MD2-HD (10 disks per box) .....

Maxell MD2-HD (10 disks per box) .....	23.
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##### Verbatim DataLife (10 disks per box) .....

Verbatim DataLife (10 disks per box) .....	22.
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##### 3 1/2" DS/DD Disks (720k)

Sony (10 disks per box) .....	19.
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##### Fuji (10 disks per box) .....

Fuji (10 disks per box) .....	19.
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##### Maxell (10 disks per box) .....

Maxell (10 disks per box) .....	20.
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##### 3 1/2" DS/High-Density Disks (1.44 Meg)

Sony (10 disks per box) .....	55.
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##### Fuji (10 disks per box) .....

Fuji (10 disks per box) .....	55.
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##### Maxell (10 disks per box) .....

Maxell (10 disks per box) .....	59.
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#### MISCELLANEOUS

##### CompuServe

CompuServe Information Service .....	24.
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##### Grolier's OnLine Encyclopedia .....

Grolier's OnLine Encyclopedia .....	32.
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##### Cables ... lifetime

Smartmodem-to-AT cable (9 feet) .....	15.
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##### Parallel Printer cable (15 feet) .....

Parallel Printer cable (15 feet) .....	19.
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#### OUR POLICY

- We accept VISA and MASTERCARD only.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order (in the U.S.).
- No sales tax.
- All U.S. shipments insured; no additional charge.
- APO/FPO orders shipped 1st Class Mail, charged by weight.
- Allow 1 week for personal and company checks to clear.
- COD max. \$1000. Cash, cashier's check, or money order.
- 120 day limited warranty on all products.\*
- To order, call us Monday through Friday 9:00 to 9:00, or Saturday 9:00 to 5:30. You can call our business offices at 603/446-3383 Monday through Friday 9:00 to 5:30.

#### SHIPPING

- Note: Accounts on net terms pay actual shipping.
- Continental US:
  - For monitors, printers, Bernoulli Boxes, computers, and hard drives, pay actual charges. Call for UPS 2nd Day & Next-Day-Air.
  - For all other items, add \$3 per order to cover UPS Shipping. For such items, we automatically use UPS 2nd-Day-Air at no extra charge if you are more than 2 days from us by UPS ground.
- Hawaii:
  - For monitors, printers, Bernoulli Boxes, and computers, actual UPS Blue charge will be added. For all other items, add \$3 per order.
- Alaska and outside Continental US:
  - Call 603/446-3383 for information.

For IBM Personal Computers exclusively.

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# PC Presents.

## You better not pout!

### ('Cause Santa Dos is coming to town.)

**H**ere in the yuletide town of Marlow, NH (pop. 556), most of our neighbors have rather traditional ideas of holiday gift giving. For software, a nice new pair of red thermal underwear would be a real hearth warmer. Hardware? Well, a chainsaw might be really sharp. And, as for utilities, a telephone and running water would be welcome additions to some homes. Nevertheless, being hip to the trendy tastes of the microcomputer age, our very presentable mascots are making sure that we're well-stocked with PC games and gadgets for the byte-bitten on your Christmas or Hanukkah list.

## It's a wrap!

People often ask us why we go to such lengths to satisfy customers. Well, our Customer Service Director thinks it's good business. Our Advertising Director thinks it makes good copy. Our mothers think it's their influence. But, actually, we give such

nice (as opposed to naughty) service because of that famous list that Santa and his raccoons are making (and checking twice, we hear). But, frankly, we're a little worried about companies who don't give toll-free support, or who charge your credit card before they ship, or who don't ship backorders free, or who have developed any of those other naughty mail order habits. It's lump o' coal city for those dudes.

## You're gonna get what's coming.

At our modest headquarters in the former Christmas Trees Inn in Marlow, we're frantically doing our last minute holiday shopping. If you want to be on our list, just place an

order of \$500 or more by January 31st, and you will get your very own surprise present from PC Connection! Specially programmed to self-destruct if opened before Christmas.

Just call 1-800/243-8088 or 1-603/446-3383, M-F 9:00 to 9:00; Saturday to 5:30. If you're planning to visit please call ahead.



A surprise present which will so doubt feature our most gifted mascot. Offer not available to net accounts. One per customer.

For IBM Personal Computers exclusively.

# PC CONNECTION®

## ■ 20-MHz 286-BASED PCs

and install a total of 16MB of RAM on standard AT memory cards.

One slot on the test machine was occupied by a card with serial, parallel, and game ports; these ports required two openings on the back of the box, even though the board took up only one slot. Dataworld's newer models will come with one parallel and two serial ports. The second serial port will fit into a knockout on the back panel, separate from the slot openings; this way, the ports will use up only one slot. The case actually has a total of four extra knockouts, two large and two small. All the ports on the sample machine were neatly labeled—an uncommon and welcome detail.

Dataworld supplied a NEC MultiSync II monitor with only an EGA connector, which we plugged into the EGA jack on the ATI VGA card in the computer. This combination produced the slowest result on the Video BIOS benchmark tests.

Dataworld's manuals look like bargain-basement productions, but they offer exceptionally clear and detailed instructions for setting up the machine.

The Data 286-20 may not have out-raced the other machines in terms of speed, but it meets high standards in just about every other category.

### DELL COMPUTER CORP.

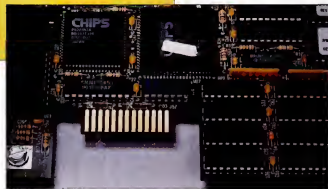
#### Dell System 220

If you thought the IBM PS/2 Model 30 was the cutest-looking computer you ever saw, wait until you see the Dell System 220. This tiny machine comes in a case that seems designed for a clone of the Model 30 but has even more diminutive disk drives and a power switch so small that you may decide to use your little finger to toggle it. Even if the case was originally designed for a Model 30 clone, someone at Dell had the bright idea of putting a far more powerful computer than the Model 30 inside.

Dell equips this machine with a one-third-height, 1.44MB, 3½-inch floppy drive plus an optional hard disk and builds the ports, video, speaker, and controllers into the motherboard. Because Dell hides its optional hard disk under the floppy disk drives, you can install two floppies and a hard disk. In contrast, IBM puts the Model 30's hard disk in the same size bay as a



*The compact design of the Dell System 220 is mercifully kind to small desktops but limits expansion possibilities. The VGA feature connector is incorporated directly onto the motherboard, which provides the same expandability found on VGA adapter boards and saves one slot for another add-in card. A system with 1MB RAM, a 40MB hard disk, and a VGA monochrome display costs \$3,119.*



floppy, giving you room for a total of only two drives of either type. Until someone devises a one-third-height tape backup unit, Dell's second drive opening can be used only for a second 3½-inch disk drive.

The front of the machine has an exposed (perhaps too exposed) power switch. There's no reset switch to be found, and because the machine switches down from 20 to 8 MHz via a keystroke combination, there's no turbo switch either.

Dell, like IBM, gives you only three expansion slots, but the Dell slots accept 16-bit AT-style expansion cards and give you more room to house the cards that cause space problems in IBM's chassis. Dell's proprietary motherboard design holds one parallel port, two serial ports, a VGA port, and a hard-and-floppy disk controller. As in the Model 30, the ports don't waste any slot space but are aligned with the motherboard at the back of the

computer. Inside the computer is a VGA feature connector—the kind supplied by IBM for future hardware add-ons whose possible functions IBM refuses to describe.

Whereas the Model 30 gives you one serial port and one dedicated mouse port, Dell gives you two serial ports, a setup that offers more flexibility without taking away options. If you use the first serial port for a modem, you can use the second port for either a mouse or a cable that lets you send and receive data from another machine. You may need that cable, because you won't be able to fit a 5¼-inch drive into Dell's diminutive case. Dell sells a \$280 external 5¼-inch drive that reads 1.2MB and 360K disks. The external drive requires one of those three precious expansion slots.

The unit we tested came with a 40MB hard disk made by Conner; a 100MB hard disk is also available. The 40MB model

# The Ultimate Screen Print and Capture Software

# Pizzazz Plus

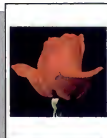
## Desktop Publishing

- At last! Transfer any image into your favorite desktop publisher including Ventura Publisher, Aldus PageMaker, and Microsoft Word.
- Convert text screens to graphics for use with reports, documents, or manuals quickly and easily.
- Image detail remains sharp and clear when converting color images into black & white with support for up to 256 gray scales.
- Refine and smooth edges for a look that seemed impossible before.



These images were captured with Pizzazz Plus, imported into Ventura Publisher and printed.

## IBM PS/2 VGA and MCGA



Pizzazz Plus printed image from an IBM PS/2 VGA.

- Deeper blues, enrich reds, and sharpen greens with on screen VGA 256,000 level color adjustment. Color images are automatically converted to gray scales on screen.
- Go from 4 color printing to full color printing with expanded printer capability.
- Automatically convert text screens to graphics.
- No more printer limitations—what you see on screen is what you'll get on paper.

## Professional Printing

- For a print out that doesn't look like it was created with a computer, make circles round and flowers soft with the smoothing feature.
- Choose your own standard of measurement, whether it's inches, millimeters, or points.
- Don't loose the detail when sizing your image up or down—Pizzazz Plus preserves proper aspect ratio.
- Select your print size and position on paper to .01".



Pizzazz Plus printed image from an AT&T Teletext TARGA 16.

## Resolves Incompatibility



Pizzazz Plus printed images from an IBM EGA.

- Connect with over 200 printers—that's twice as many as most applications support.
- Capture your screens for easy interchange of popular program file formats such as Splash! by Spinnaker and Publisher's Paintbrush by Z-Soft.
- Fully supports high performance image display boards such as the AT&T TARGA 16, AT&T ICB, and ATronics P1B.
- Works with virtually all PC DOS applications.

## Pizzazz Plus Compatible Hardware

IBM PS/2: Models 25 and 30 (MCGA), and Models 50, 60, and 80 (VGA)  
 IBM PC, XT, and AT Display Adapter Cards: AT Technologies' EGA Wonder, ATronics Professional Image Board P1B, AT&T Image Capture Board (ICB), Teletext TARGA 16 Hercules Color Card, Monochrome Graphics Card, IBM Enhanced Graphics Adapter (EGA) Color Graphics Adapter (CGA), Monochrome Display Adapter, NEC CB-1 Color Graphics Board, Paradise AutoSwitch EGA, Plastotronics PC+ Colorplus Graphics Adapter, Quadram QuadEGA+, GoodEGA ProStyle, Quadrender II, STB Graphics Plus II, Teconer Graphics Master, Triang Laboratories EVA, EVA486, Video-7 Vega VGA, Vega Deluxe, Vision Technologies Vision 16 EV-680

VGA Compatible Adapter Cards: (ONLY Supported in IBM PS/2 VGA Compatible Models) AST VGA, Compuserp VGA, Orchid Designer VGA, Paradise VGA Plus Card, Video-7 VEGA VGA AT&T 6300 Display Adapter Card Image Capture Board (ICB), Teletext TARGA 16, GEB PRINTER, Adobe Systems PostScript, Alps ALQ2000 (B and 24 pin), ALQ2000 (B and 24 pin), P2400C (18 and 24 pin), AMT Office Printer, Anadex 9625B, 9725, 5702A, 5702AC, AST TurboLaser/PS, AT&T 477, C. Itek 1550 Proview, 8510, 8510BPI, 8510SC, C-310 CXP, C-315 CXP, C-715A (LQ-1000), CalComp ColorMaster, ColorView 5912, PlotMaster, Canon A1210, PJ-1000A, Certronics 250, 260, 350, 359, CIE LIPS II, Citrine MSP-20, NSI-25, Delta products 8000, 8001, 8002, 8010, 8011, 8012, 8020, 8021, 8022, 8050, 8051, 8052, 8070, 8070 Plus (8080, 8070 Plus P-Series, 8071, 8072, 8080, 8081, P-132, Diablo C150, Epson 6PFX-5000, EX-800, EX-1000, FX-80, FX-85, FX-86C, FX-100, FX-165, FX-286, FX-286C, FX-450, FX-1050, FX-2500, FX-2500 II, 5MB, HS-80, JX-80, LQ-800, LQ-450, LQ-950, LQ-1000, LQ-1050, LQ-1500, LQ-2500, LQ-2550, LX-80, LX-90, LX-800, MX-80 w/Color, MX-100 w/Color, RX-80, RX-100, SQ-2000, Fujitsu DL2400, DL2600, DL3300, DL3400, DuoMax 24C, DPL24C, DX2160, DX2250, Genicom 1000i (Epson), 1000i (8080, 3310), Hewlett Packard LaserJet, LaserJet+, LaserJet Series II, PaintJet, ThinkJet

(Open MX-80 Mode), IBM Color Jetprinter, Graphics Printer, PC Color Dot Matrix, ProPrinter, ProPrinter XL, Quarterley 5201-602, IDS Microprint, Prism 80, Prism 132, Induscribe 1200, JDL 850, NEC CPC-37, LC-800, P2200, PS, PSXL, P5200, PS300, P6, P7, P9XL, Newbury Data OSP-2, OSP-3, Ours LaserPro 810-R, Okidata Laserline 6, Microline 82, 83, 84, 92, 93, Microline (Plug&Play) 82, 83, 84, 92, 93 Microline IBM 182, 192, 193, Microline 292, 293, 294, 320, 321, Microline (IBM) 292, 293, 294, 320, 321, 390, 391, 392, Okmate-20, Panasonic KXP-1000, KXP-1051, KXP-1051L, KXP-1052, KXP-1052L, KXP-1053, KXP-1053L, KXP-1054, KXP-1054L, KXP-1055, KXP-1055L, KXP-1056, KXP-1056L, KXP-1057, KXP-1057L, KXP-1058, KXP-1058L, KXP-1059, KXP-1059L, KXP-1060, KXP-1060L, KXP-1061, KXP-1061L, KXP-1062, KXP-1062L, KXP-1063, KXP-1063L, KXP-1064, KXP-1064L, KXP-1065, KXP-1065L, KXP-1066, KXP-1066L, KXP-1067, KXP-1067L, KXP-1068, KXP-1068L, KXP-1069, KXP-1069L, KXP-1070, KXP-1070L, KXP-1071, KXP-1071L, KXP-1072, 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## 20-MHz 286-based PCs: Summary of Features

The following commentary analyzes some of the terms in this table of features. The phrases in bold type are listed in the same order as in the left-hand column of the table.

**Basic configuration.** Because hardware vendors frequently offer a choice among various hard disk drives and monitors—at different prices—we are reporting the price of a completely stripped-down model as a “basic” configuration. Note that these prices are not always strictly comparable (Northgate does not sell the 286/20 SuperMicro without a hard disk). Therefore, when comparing products, please consult the “standard configuration” prices as well.

**Software included.** Hardware manufacturers may or may not bundle software with their computers. Bundled software may include DOS, disk caching programs, setup and install programs, and various utilities. DOS is often available only at an additional cost.

**Reset switch.** Many computers now come with a reset switch that allows a cold reboot of the computer. This switch saves wear and tear on the power switch.

**Clock/calendar.** An internal, battery-operated clock/calendar makes it unnecessary to reset the computer's time and date each time the computer is turned on.

**Standard configuration.** Purchasers will normally want a more elaborate system than our “basic” configuration. For the sake of price comparisons, our “standard” configuration includes 1MB RAM, a hard disk of at least 30MB, one floppy disk drive, a monochrome display, at least one parallel and one serial port, DOS, and a keyboard. The price of each system is followed by the size of its hard disk. No price appears for the Vector Escalibur because the company does not provide a monochrome or a VGA system.

**Tested configuration.** The specifications (and list prices) of the evaluation units depend on what configuration each manufacturer has decided to send us for testing. **Upgrades and additions to the basic configuration** summarizes the distinctive features of the models that were actually reviewed.

**Bus clock speeds (MHz).** Bus speed becomes more important as computers run at faster clock speeds. A computer's bus speed may actually be too fast for expansion cards, most of which operate at 8 or 10 MHz. Time-out periods, sometimes called wait states, are often used to slow down the bus.

**Disk controller manufacturer/type.** Several interfaces are used to control the way data is transferred from the hard disk to the computer. The most common disk interface standard is the ST-506/412, used in the IBM PC-XT and PC AT. Two other common data transfer interfaces are SCSI (Small Computer System Interface) and ESDI (Enhanced Small Device Interface). Both SCSI and ESDI require special hard disk controllers and cannot run off existing PC-XT or PC AT controllers.

**Disk encoding techniques** currently include RLL (Run Length Limited) and the older MFM (Modified Frequency Modulation) scheme. All data is encoded onto and read from your hard disk as a series of polarity-reversing bits representing ones and zeros. Nine such bits would be needed to store 12 bits of data in MFM format, and only six polarity changes are required with RLL format. Thus, MFM takes more space than RLL but provides a more stable environment and is more commonly used. ST-506 technology, for instance, uses the MFM encoding scheme.

**BIOS version and date.** The BIOS data is important to those planning to use 3 1/2-inch disk drives. Early BIOS versions cannot handle this format.

**Memory chip type.** In this context, Kb and Mb refer to kilobits and megabits, respectively.

**Chip packaging.** Memory chips come in a variety of styles: DIPs, SIPs, and SMMs. The Dual In-line Package (DIP) is the traditional buglike computer chip sprouting 8, 14, 24, or even 40 or more metal legs (seventy divided between right and left sides). Single In-line Packages (SIPs) are single-package arrays of computer chip logic assembled so that all connecting legs are in a straight line.

BASIC CONFIGURATION	Micro 1 Power 286-20	Datavworld Delta 286-20	Zoss 286-20	Dell System 220	Vector Escalibur 286	Northgate 286/20 SuperMicro
List price	\$1,250	\$1,492	\$1,845	\$2,099	\$2,295	\$2,499
RAM	512K	1MB	1MB	1MB	512K	1MB
Floppy disk drive	One 1.2MB 5 1/4-inch	One 1.2MB 5 1/4-inch	One 1.2MB 5 1/4-inch	One 1.44MB 3 1/2-inch	One 1.2MB 5 1/4-inch	One 1.2MB 5 1/4-inch and one 1.44MB 3 1/2-inch
Hard disk drive	None	None	None	None	None	65MB
Drive bays	Five half-height (or six in lower case)	Five half-height	Five half-height	One half-height, two one-third height (all 3 1/2-inch)	Three half-height	Five half-height
Software included	Setup, diagnostics, disk formatting	Setup, diagnostics	Setup, diagnostics	Setup, diagnostics	Setup, diagnostics, DOS 3.3, GW-BASIC	Setup, diagnostics, VQprt disk optimizer, disk cache
OS/2 available	○	○	○	● (\$325)	○	○
Monitor	None	None	None	None	None	14-inch flat-screen monochrome
Ports	1 serial, 1 parallel	1 parallel	1 serial, 1 parallel	2 serial, 1 parallel	2 serial, 1 parallel	2 serial, 1 parallel
Slots	Two 8-bit, six 16-bit	Two 8-bit, six 16-bit	Two 8-bit, six 16-bit	Three 16-bit	Two 8-bit, six 16-bit	Two 8-bit, six 16-bit
Power supply (watts)	200	200	200	85	200	200
Reset switch	●	●	●	○	●	●
Clock/calendar	●	●	●	●	●	●
Keyboard style	IBM Enhanced	IBM Enhanced	IBM Enhanced	IBM Enhanced	IBM Enhanced	Modified IBM Enhanced (function keys at left)
Keyboard cable length (inches)	96	96	72	72	72	72

●=Yes ○=No N/A=Not applicable; product does not have this feature.

\*Although a VGA card was provided, benchmark tests were run in EGA mode because the monitor's connector limited video capability to EGA.

like the teeth on a comb. Single In-line Memory Modules (SIMMs), on the other hand, are individual logic devices that are installed on their own small circuit board, creating a component module that can be plugged into a larger device. Their physical arrangement duplicates the integrated structure of a SIP but allows for the possibility of replacing an individual memory component if necessary.

DIPs, SIPs, and SIMMs are attached to circuit boards in several ways. Sockets are often used and can be a great boon when repair time comes. Although the socketed chips can be speedily replaced, reliability suffers because of corrosion at the contact points. Soldered chips are considered the most reliable, as there is no possibility for a chip to move or for its contact with the circuit board to deteriorate.

**RAM chips.** RAM chips come in two basic types, static and dynamic. Static RAM chips (SRAMs) are faster and more efficient but costlier. Dynamic RAM chips (DRAMs) cost less and are more common, but the tradeoff is in slower processing and operation.

**Interleaved memory.** CPU speed is usually faster than memory speed. Interleaved memory increases processing speed by splitting the memory into two or more portions. The CPU then sends information to a section at a time, allowing one section to process while another receives data.

**Shadow RAM.** Shadow RAM is a technology that loads system BIOS or video BIOS directly into fast RAM on board-up of the computer. The BIOS then operates much faster.

**Disk cache software.** Some companies provide their own software to facilitate caching. Other computers can generally take advantage of the caching facility within some version of DOS.

**FCC certification class.** Two classes of FCC (Federal Communications Commission) approval may be given to computers: Class A and Class B. These classes concern levels of radio-frequency interference. With Class A approval, a computer may be operated in a business locale. The tougher Class B rating allows home use as well, where computers are likely to be placed near radios and television sets. Certification tests must be performed by private testing companies. The passing results are then sent to the FCC for final certification, a process taking several months or more.

STANDARD CONFIGURATION	Micro 1 Power 286-20	Dataworld Data 286-20	Zees 286-20	Dell System 220	Vector Escaliber 286	Northgate 286-20 SuperMicro
Price of monochrome system with 1MB RAM, hard disk, and DOS	\$2,055 (32MB)	\$1,938 (32MB)	\$2,163 (32MB)	\$3,119 (40MB; VGA monochrome)	N/A	\$2,564 (65MB)
Price of VGA system	\$2,630	\$2,743	\$2,668	\$3,319	N/A	\$3,025
TESTED CONFIGURATION						
List price	\$3,596	\$2,908	\$4,563	\$4,418	\$3,775	\$4,547
Upgrades and additions to the basic configuration	2MB RAM, 45MB hard disk, VGA card and monitor, disk cache, DOS 3.3, GW-BASIC, tower case	40MB hard disk, VGA card and monitor, I/O card with 1 serial, 1 parallel, 1 game port	4MB RAM, 64MB hard disk, VGA card and monitor, 80387 coprocessor, DOS 3.3, GW-BASIC	2MB RAM, 40MB hard disk, VGA Color Plus monitor, disk cache, DOS 3.3, GW-BASIC	1MB RAM, 65MB hard disk, EGA card and monitor	4MB hard disk, 60MB tape backup, VGA monitor
Microprocessor clock speeds	6.8/10/20 MHz	10/20 MHz	10/20 MHz	8/20 MHz	10/20 MHz	10/20 MHz
Wait states	0, 1	0	0	0	0	1
Bus clock speeds	6.8/10/12 MHz	8/12 MHz	10 MHz	8 MHz	8/10 MHz	8 MHz
Disk controller manufacturer and type	OMIT (MFIM)	Data Technology (MFIM)	Adaptec (RLI)	Connor (ST-506)	Adaptec (RLI)	Adaptec (SCSI)
System drive capacity	Controller card handles 2 floppy and 2 hard disk drives	Controller card handles 2 floppy and 2 hard disk drives	Controller card handles 2 floppy and 2 hard disk drives	System board handles 2 floppy and 1 hard disk drive	Controller card handles 2 floppy and 1 hard disk drive or 1 floppy and 2 hard disk drives	Host adapter handles 2 floppy and 7 hard disk drives
BIOS version and date	AMI (April 1988)	Award, Version K3.03C2 (July 1988)	Phoenix BIOS Plus, Version 3.10 (March 1988)	Phoenix, Version 3.10 (April 1988)	Award, Version 3.03 (1988)	Award, Version 3.03 (1987)
System board manufacturer	Novas	Dataworld	TMC	Dell	Vector	Northgate (DTK)
286 chip set manufacturer	Chips and Technologies	Chips and Technologies	Chips and Technologies	Chips and Technologies	Chips and Technologies	N/A (uses discrete logic)
MEMORY SPECIFICATIONS						
Memory chip type	256Kb, 1Mb	256Kb	256Kb, 1Mb	256Kb, 1Mb	256Kb, 1Mb	256Kb, 1Mb
Chip packaging	SIP	DIP	DIP	SIMM	DIP	DIP
RAM chips	DRAM	DRAM	DRAM	DRAM	DRAM	DRAM
Interleaved memory	●	○	●	●	●	○
Shadow RAM	●	○	●	●	●	○
Disk cache software	●	○	○	○	○	○
Maximum RAM on motherboard	8MB	2MB	4MB	8MB	4MB	4MB
Maximum total system RAM	16MB	16MB	16MB	16MB	16MB	20MB
OTHER						
Warranty	1 year	1 year	1 year (30-day money-back guarantee)	1 year on-site service	1 year (3 months on-site service)	1 year
FCC certification class	A	A	B	B	A	A



## ■ 20-MHz 286-BASED PCs

was so quiet that I scarcely would have noticed it if the C> prompt hadn't appeared on-screen. The disk isn't among the fastest tested in this roundup, but it zips through the benchmark tests when used with Dell's licensed version of Multisoft's Super PC-Kwik Disk Accelerator. This cache doesn't come with the computer, but it's one of the utilities that come with Dell's "enhanced" \$120 version of DOS 3.3. Dell will sell you OS/2 for \$325, if you insist.

Dell's built-in VGA, based on the Chips and Technologies chip set, produced moderately fast results in the PC Labs video benchmark tests. It failed the DAC (digital-to-analog-converter) Palette direct write tests, producing only a thin line of color at the top of the screen instead of coloring the entire screen. This test changes the colors of the display palette by using the DAC chip directly. It also proved unable to run the two monochrome video modes, indicating incompatibility with IBM's motherboard version of the VGA interface. But for most office applications, what matters more is the unique and outstanding VGA text font. Unlike IBM's unappealing font, the Chips and Technologies chips use a well-proportioned, thinned, highly legible font that resembles standard Courier. The font looks a bit strange at first glance on-screen, but quick-

ly proves easier to read than any other VGA font on the market.

Our test unit came with a Dell VGA Color Plus monitor. Recognizing the realities of the business market, Dell offers a VGA monochrome monitor as a money-saving alternative. The price for a system

with 1MB of RAM, one floppy disk drive, and a VGA monochrome monitor is \$2,299. An extra megabyte of RAM costs \$1,000.

Chips and Technologies supplies the chip set that supports the System 220's CPU. The Dell was one of the few machines tested that used a chip set rated at 20 MHz. Dell's 80286 chip was silk-screened with Dell's corporate name and a 20-MHz rating, but beneath the silk-screening a 16-MHz rating was apparently marked by the original manufacturer. For competitive reasons, Dell won't name the maker of its 80286, but it warrants the chip to perform at 20 MHz. Dell uses a Phoenix Technologies BIOS rather than the more common Award one. The bus speed is a safe, slow 8 MHz.

The System 220 gets its memory from 80-nanosecond SIMMs, which fit into eight sockets on the motherboard. The computer is presently available with 1 or 2MB. If you use 1-megabit SIMMs rather than 256-kilobit ones, you can cram 8MB on the motherboard. Another 8MB can be added via an AT-style memory card. Our test machine originally ran about 20 percent slower with 1MB than with 2MB, but Dell sent a BIOS upgrade that made the machine perform at full speed with either memory chip size. Dell says it will supply the same upgrade to everyone who bought



### FACT FILE

#### Dell System 220

Dell Computer Corp.  
9505 Arboretum Blvd.  
Austin, Texas 78759  
(800) 426-5150

**List Price:** With 1MB RAM, 1.44MB 3½-inch floppy disk drive, \$2,099; with VGA card and monochrome monitor, \$2,299; with 40MB hard disk, \$2,999; with 100MB hard disk, \$3,799. 1MB RAM upgrade, \$1,000; 1.2MB 5¼-inch external floppy disk drive, \$280; 1.44MB 3½-inch floppy disk drive, \$200; VGA Color monitor, \$200; VGA Color Plus monitor, \$300; 80287 math coprocessor, \$400. Dell "enhanced" DOS 3.3, \$120. **In Short:** An excellent compact design with exceptional ease of installation but limited possibilities for expansion. For instance, the only drives you can install are 3½-inch one-third-height models. The built-in VGA doesn't pass all compatibility tests, but the machine performed well on other benchmark tests.

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machines with the earlier BIOS.

The diminutive power supply in the System 220 cranks out only 85 watts, but this should be adequate for any expansion cards you can squeeze into the case. The power supply includes an outlet suitable for a monochrome monitor. You're better off plugging VGA monitors into a separate outlet.

The 101-key IBM Enhanced-style keyboard that came with the System 220 had a soft but acceptable feel and a full-size Backspace key.

Dell's manuals and software make this the one machine I'd be willing to hand to a beginner or to install in an office. The superb installation and diagnostic manual is far more lucid and useful than anything IBM ever offered. The System Support Diskette has functions comparable with those on IBM's hard-to-get Advanced Diagnostics disk.

The System 220 follows the design philosophy of the IBM PS/2 Model 30 but vastly improves on it. This is an impressive, well-integrated design, with superb documentation and software. For unsophisticated users, it may be the only choice among 20-MHz 286 machines. More-sophisticated users will have to balance its integrated and advanced design against its limited possibilities for expansion.

## MICRO I INC.

### Micro 1 Power 286-20

The Micro 1 Power 286-20 shows that you can do a lot with the right set of parts. The preliminary manual that came with the test unit consisted of booklets on each of the separate parts of the machine; there was one manual for the motherboard, another for the controller, and a different one for the VGA card, but none for the system as a whole. This loose-leaf collection didn't inspire confidence—until we ran the Power 286-20 and found it to be one of the best performers among the machines in this roundup. The whole turned out to be more than merely the sum of its parts.

Micro 1 sent us its tower model for review, although the company sells a similar machine in a standard AT desktop case. The price for a desktop system with 512K RAM and a 1.2MB floppy disk drive is \$1,250. Our more elaborately equipped



*A fast and flexible system, the Micro 1 Power 286-20 is available with a monochrome system with 1MB RAM and a 32MB hard disk for \$2,055. Although the tower model has room for six drives in its sturdy drive cage, the power supply has only four device connectors.*

tower model, with four times the RAM, a 45MB hard disk, a VGA card and Samsung monitor, and DOS 3.3, costs \$3,596. And if you don't want to spend any money at all, Micro 1 can accommodate you, too. If you have a slow and aging IBM PC AT on hand and want a faster machine, Micro 1 will hand you a Power 286-20 with a 32MB Seagate hard disk, in equal exchange. This policy will come in handy for companies that buy only IBM but want to trade up to something faster.

Like most tower designs, Micro 1's has a marginally unstable feel, because the heavy electromechanical parts are near the top and the lightweight circuit boards are near the bottom. Starting from the top, the box contained a 200-watt power supply and a sturdy cage holding a 1.2MB TEAC floppy disk drive, a quiet 45MB 3½-inch hard disk, and openings for four additional half-height drives. If you decide to add four drives, you'll need Y-connectors for the power cables coming out of the power

## ■ 20-MHz 286-BASED PCs

supply because the supply itself has connectors for only four devices. The hard disk is a good performer in its own right, but Micro 1 adds to its speed by including the excellent Super PC-Kwik disk cache. At one point during our disk tests, the speaker started screeching loudly, apparently because of a disharmonic interaction with the drive. It didn't sound pretty, but it didn't happen twice.

In the middle of the front panel are Micro 1's flimsy logo, a keylock that didn't turn off the keyboard when locked, a pair of reset and turbo switches, and the power switch. When you turn on the Power 286-20, it runs at 10 MHz. One press of the turbo switch brings it up to 20-MHz with one wait state, and a second press turns on the turbo light and reduces the wait-state level to a claimed figure of zero. Speeds of 6, 8, 10, and 20MHz can also be selected from the keyboard and from the DOS command line. When the computer was tested at full speed, it gave better performance than all the machines of this group on most of the processor benchmark tests and was nearly the best on the other benchmark tests.

Working my way down the tower, I found a Taiwanese "Novas Super Turbo 286X" motherboard, with two 8-bit and six 16-bit expansion slots. The 2MB of



## Benchmark Tests: 20-MHz 286-based Computers

**P**C Labs tested six 80286 computers running at 20 MHz and normalized the results against those for the 8-MHz IBM PC AT. Although these machines operate at a clock speed of 20 MHz, most use micro-processors rated for 16-MHz operation. Benchmark results for all of these machines are fairly close; on only a few tests did certain contenders outshine the pack.

PC Labs' NOP test, which measures clock and processor speed, showed all six computers huddled around the 1.6/1.7-second mark. Just slightly more disparity is evident on the 80286 Instruction Mix test; this is a processor-intensive test, and differences among systems are minimal. The Floating-Point Calculation test also showed little difference among the computers reviewed. The results of these three tests demonstrate that oscillating 16-MHz chips to 20 MHz does indeed speed up the processor consistently.

For the Conventional Memory test, the winners were the Micro 1 Power 286-20, the Northgate 286/20 SuperMicro, and the Dataworld Data 286-20, with the slowest in the whole group only .08 seconds behind the leader.

Throughput measured by the DOS File Access tests with small and large records was fastest on the Northgate 286/20 SuperMicro because of the fast SCSI drive, which is standard on most configurations of the Northgate system. Next in line was the Vector Excalibur 286, on both the small- and large-record tests, with its fast RLL controller and TEAC hard disk. Not to be ignored is the Micro 1 Power 286-20, which uses MFM technology with a Toshiba hard disk; it came in third on the small-record test. Zeos, with an RLL controller and a TEAC hard disk, was third on the large-record test.

The Dell System 220's hard disk, running with an ST-506 controller card, was the slowest among the reviewed computers in handling large records; the Dell has a 3½-inch drive to fit the computer's small-footprint packaging. Two computers, the Dell System 220 and the Micro 1 Power 286-20, are equipped with disk-caching software, which greatly increases their speed on the benchmark tests (not reported here). The Dell sped up to achieve scores of 11.60 seconds on the small-record test and 8.79 seconds on the large-record test, while the Micro 1 had even faster results with caching: 10.69 seconds for small records and 7.08 seconds with large records.



## FACT FILE

### Micro 1 Power 286-20

Micro 1 Inc.  
557 Howard St.  
San Francisco, CA 94105  
(800) 338-4061 (outside Calif.)  
(415) 974-5439

**List Price:** With 512K RAM, 1.2MB 5¼-inch floppy disk drive, \$1,250; with 1MB RAM, 45MB hard disk, VGA card and 14-inch color monitor, \$2,695. 1MB RAM upgrade, \$575; 32MB hard disk, \$309; 45MB hard disk, \$485; 40MB tape backup, \$489; 1.44MB 3½-inch floppy disk drive, \$129; EGA card and 14-inch monitor, \$499; VGA card and VGA Plus monitor, \$749; 80287-10 math coprocessor, \$309.

**In Short:** One of the fastest and most flexible 286 systems available, with many expansion and configuration options, some suited only for advanced users. You can get one of these as an even exchange for an IBM AT.

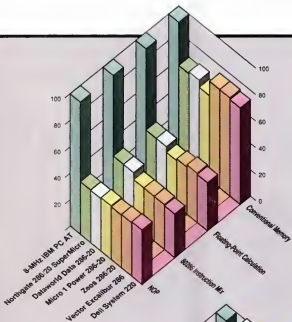
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### Processor and Memory Benchmark Tests

### Disk Benchmark Tests

**Performance Times**  
(Times given in seconds  
except where noted)

	NOP	80286 Instruction Mix	Floating- Point Calculation	Conven- tional Memory	DOS File Access (small record)	DOS File Access (large record)	BIOS Disk Seek (milli- seconds)
8-MHz IBM PC AT	4.17	8.96	35.60	0.74	72.63	19.73	29.20
Northgate 286/20 SuperMicro	1.68	3.52	13.84	0.50	57.54	6.04	22.66
Dataworld Data 286-20	1.65	3.51	13.84	0.51	70.91	8.45	29.72
Micro 1 Power 286-20	1.68	3.03	12.29	0.47	67.46	8.12	22.43
Zeos 286-20	1.65	3.03	12.77	0.55	68.97	6.56	32.31
Vector Excalibur 286	1.67	3.02	13.36	0.55	60.00	6.39	21.67
Dell System 220	1.70	2.94	13.00	0.54	68.33	13.43	25.90



## Processor and Memory Benchmark Tests

**Relative Times**  
(IBM PC AT = 100)

The **NCP** benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NCP ("No Operation") machine code instructions in a big 128K loop.

The **80286 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 80286 instruction code. These instructions are a subset of the total processor instruction set.

The **Floating-Point Calculation** benchmark test measures processor speed by looping through a series of floating-point calculations, including multiplication, division, exponentiation, and logarithmic and trigonometric functions. The benchmark program uses the floating-point library included with Microsoft C Compiler 4.0.

The **Conventional Memory** benchmark test allocates 256K of conventional memory and treats it as a series of 64-byte records. Then, 16,384 random records are read into and written from this memory. The result shown is the average of the read and write times.

The **DOS File Access** benchmark test measures the throughput rate of the disk being tested. In this case, throughput times are measured in terms of how long the disk takes to perform common DOS file-management functions. Five tasks—file creation, sequential file write, sequential file read, random file write, and random file read—are timed and the results summed.

The test is carried out for two different types of files—small-record files and large-record files—that are used by common PC applications. Files created using small records are typically used by database management programs, and large records are typically used for word processing and spreadsheet files. Loading a DOS program is also simulated by the large-record test.

The **BIOS Disk Seek** benchmark test measures the time it takes to do a random seek using the disk's ROM BIOS. The test result includes minimal software overhead and may not parallel the manufacturer's claimed average access time. The test program performs 1,000 seeks. The average result is shown in milliseconds.

## Disk Benchmark Tests

**Relative Times**  
(IBM PC AT = 100)

(continues)



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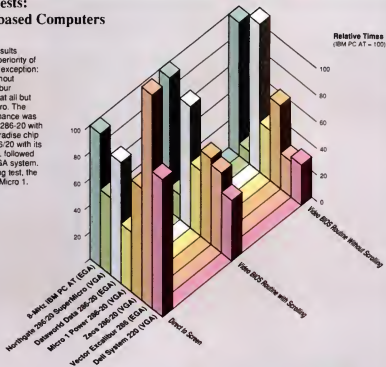
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CIRCLE 519 ON READER SERVICE CARD





## Benchmark Tests: 20-MHz 286-based Computers

The video benchmark test results generally confirmed the superiority of VGA cards, with one surprising exception: on the Video BIOS Routine Without Scrolling test, the Vector Excilbur 286—with its EGA adapter—beat all but the Northgate 286/20 SuperMicro. The fastest Direct to Screen performance was achieved by the Micro 1 Power 286-20 with a 16-bit VGA card using the Paradise chip set. Next was the Northgate 286/20 with its 16-bit VGA using Video-7 chips, followed by the Zeos 286-20, an 8-bit VGA system. On the Video BIOS with Scrolling test, the order was Northgate, Dell, and Micro 1.



The **Direct to Screen** benchmark test measures the bandwidth of the video adapter by writing directly to the display memory buffer. The test is performed in video mode 3. The entire screen is updated using the assembly language REP STOSW instruction with register CX equal to 2000. This is done 1,000 times, and the result shown is the total of the 1,000 trials.

The **Video BIOS Routine with Scrolling** benchmark test measures the speed of the BIOS Teletype routine with scrolling. The test is performed in video mode 3. The screen is cleared and 240 lines of 60 characters each (including a terminating carriage return and line feed) are written to the display through the BIOS Teletype routine. Although the first 24 lines written to the display do not involve scrolling, all the remaining lines scroll the display.

The **Video BIOS Routine Without Scrolling** benchmark test measures the speed of the BIOS Teletype routine without scrolling. The test is performed in video mode 3. The screen is cleared and 24 lines of 60 characters each (including a terminating carriage return and line feed) are written to the display through the BIOS Teletype routine. This is done ten times, and the result shown is the total of the ten trials.

### Video Benchmark Tests

Performance Times  
(Times given in seconds)

	Direct to Screen	Video BIOS Routine with Scrolling	Video BIOS Routine Without Scrolling
8-MHz IBM PC AT (EGA)	4.90	7.60	4.50
Northgate 286/20 SuperMicro (VGA)	2.85	1.39	0.42
Datsaworld Data 286-20 (EGA)	4.45	6.92	5.01
Micro 1 Power 286-20 (VGA)	2.20	3.73	1.70
Zeos 286-20 (VGA)	4.12	4.90	2.81
Vector Excilbur 286 (EGA)	7.85	4.56	1.21
Dell System 220 (VGA)	5.05	3.46	1.37

(ends)



100-nanosecond motherboard memory occupied all 8 SIP (Single In-line Package) sockets using 256-kilobit SIPs. When memory prices drop and the world turns upside down, you can replace these with 1-megabit SIPs to install 8MB on the motherboard. Standard AT memory cards can bring the system up to 16 MB. The 80286 was the ubiquitous Harris chip, rated at 16 MHz. As we finished our tests, Micro 1 told us that they had received their first shipment of 20 MHz-rated chips and would include them in all future units.

A chip set by Chips and Technologies does much of the dog work on the motherboard. Although Micro 1 readily acknowledged that this chip set is rated at 16 MHz, the "16" imprinted on the chips themselves had been erased. Both the chip set and the AMI BIOS offer elaborate setup options.

The menus used to set up the Chips and Technologies chips are the kind that make nontechnical users blanch, but you never have to use them if you don't want to, and Micro 1's toll-free tech support can walk you through options like the one that loads the BIOS into RAM for faster operations, as well as others that interleave memory for near-zero-wait-state operation. You can even run different expansion slots at different bus speeds, ranging from 6 MHz all the way up to 12 MHz. One danger in such advanced menus is that one small mistake can render the machine completely unusable until you clear out the CMOS by yanking the battery, waiting a few seconds, and then putting the battery back and setting up again.

Micro 1 installed a 16-bit Paradise VGA card with 256K of video RAM. It performed well on most of our compatibility benchmark tests but failed the Vertical Blank Interrupt test. The card is a new model (not the same as the Paradise VGA Professional that it resembles) and any bugs should be gone by December. A serial-and-parallel card and the OMT1 1:1 MFM (modified frequency modulation) disk controller fill out the system. A total of eight knockouts on the back panel—five large, three small—let you attach almost anything to the Micro 1.

Our system came with a Key Tronic 101-key Enhanced-style keyboard with a quick, responsive touch and a half-size

Backspace key. Micro 1 is happy to provide other keyboard options, so you can order one with a full-size Backspace, a MaxiSwitch keyboard, or a clicking model instead.

A cornucopia of floppy disks accompanies the Power 286-20. The machine comes with disks containing drivers and utilities for the VGA card, setup programs that supplement the ROM-based setup in the BIOS, and even a device driver that lets you use the COM3 and COM4 ports in case your DOS version doesn't allow it.

Micro 1 offers a 1-year warranty on parts and labor. Late one night, when I needed pricing information for this review, I called the toll-free tech support number at 8 P.M. Pacific time—and a technician answered on the first ring. He admitted that he didn't always work that late, but the fact that he answered at all was a refreshing change from other tech support policies.

The Micro-1 is an inexpensive machine, transforming off-the-shelf parts into excellent performance. The Power 286-20 is backed up by exceptional support. It's so flexible that it makes living without a big name no chore at all.

#### NORTHGATE COMPUTER SYSTEMS

### Northgate 286/20 SuperMicro

Never has the 80286 appeared in such splendor as in the Northgate 286/20 SuperMicro. The chip that you last saw wandering dejectedly in deserted back alleys has suddenly started riding around in a stretch limo.

Northgate's limo doesn't look fancy from the outside. It's the standard, rugged AT clone case with the striations across the front and a keylock, turbo switch, and reset switch on a panel. It has room for five half-height drives, three of which open on the front. The back has openings for eight slots plus five knockout panels for parallel and serial ports. All this will look very familiar to connoisseurs of AT-class computers. It's what's inside the Northgate—hidden behind the dark glass on the limousine—that's different.

The preferred SuperMicro configuration comes with a 42MB SCSI hard disk

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## ■ 20-MHz 286-BASED PCs

(made by Quantum) with the fastest performance of anything we looked at for this survey. It also comes with 1.2MB and 1.44MB floppy drives, and its motherboard boasts 1MB of 70-nanosecond memory. Throw in a parallel and two serial ports, a 200-watt power supply, a very fast 16-bit VGA card using Video-7 chips, an Xtron multiscan monitor, and Northgate's OmniKey/102 keyboard (with the function keys along the side and Ctrl, Alt, and Shift where anyone who has used a computer for more than 2 years expects to find them), and you'll pay a very reasonable \$3,498. Added to our test unit was a \$1,049 60MB tape backup drive.

Northgate will upgrade the 42MB hard disk to an 80MB SCSI drive for an additional \$389. Or, if you want a 65MB RLL (Run Length Limited) hard disk drive and a standard controller instead of the SCSI adapter, take \$200 off the price. If you keep the SCSI adapter, you can also buy tape backup units from Northgate.

The tested unit didn't quite match the computers that Northgate intends to ship by the end of 1988. Our model had a DTK "Mini 286AT 16 MHz" motherboard with the brand name concealed under a



*The Northgate 286/20 SuperMicro combines a swift SCSI drive and fast video to turn out top-tier performance times. As in the Datavorld machine, one of the 8-bit slots doubles as a dedicated slot for a proprietary high-speed memory board. If you select the less-expensive 65MB RLL drive over the 42MB SCSI hard disk, a monochrome system with 1MB RAM will cost you \$2,584.*



blank label. Northgate's later motherboard will be a custom 20-MHz model made by the same designer that made the DTK board in our machine. The new motherboard will have one parallel and two serial ports built in.

Northgate will ship these computers with a single Adaptec card that serves as SCSI host adapter and floppy disk controller; our test unit came with separate cards—plus a third card for the tape backup drive that Northgate included in our unit. The optional tape backup in the finished machine will hook up directly to the single SCSI adapter. Like most other vendors, Northgate initially shipped a 16-MHz Harris 80286 but sent along a 20-MHz replacement when Harris began to fill Northgate's order for the higher-rated chips. If you decide to buy this machine, make sure to ask Northgate exactly what configuration it's shipping.

The motherboard that we tested yielded some of the slower results for the Instruction Mix and Floating-Point calculation benchmark tests, but also produced some of the faster results for the memory tests. The difference between the fastest and the slowest memory and processor speeds

among the six machines we tested was not large enough to be significant in real-world applications. The more significant differences were found in disk and video performance, and here Northgate took the lead in almost all categories.

Northgate's motherboard—in both its present and future versions—uses discrete logic instead of the Chips and Technologies set found on most of the other machines in this group. The bus speed is 8 MHz. The eight slots line up as two 8-bit and six 16-bit slots, with one of the 8-bit slots doubling as a dedicated slot for a proprietary high-speed memory board. This memory board, evidently awaited by quite a few vendors of 80286 machines, hasn't materialized yet.

Our machine was populated with 1MB of luxurious-looking gold-leaded, 256-kilobit, 70-nanosecond DRAMs. Northgate specifies 70 ns. for the computers it ships but doesn't specify the kind of chips it will use. If you replace the 256-kilobit chips with 1-megabit chips, you can squeeze 4MB of RAM onto the motherboard. Using expansion cards, this system can manage a total of 20MB of RAM.

For many users, Northgate's keyboard



### FACT FILE

#### Northgate 286/20 SuperMicro

Northgate Computer Systems  
13895 Industrial Park Blvd., #110  
Plymouth, MN 55441  
(800) 548-1993 (outside Minn.)  
(612) 553-0111

**List Price:** With 1MB RAM, 65MB RLL hard disk, 1.2MB 5¼-inch floppy disk drive and 1.44MB 3½-inch floppy disk drive, 14-inch flat-screen monochrome monitor, \$2,499; with 42MB SCSI hard disk, VGA card and monochrome monitor, \$3,198; with VGA color monitor, \$3,398; with 14-inch VGA multi-synchronous monitor, \$3,498; with 65MB RLL hard disk and VGA color monitor, \$3,198. 80MB SCSI hard disk, \$919 (as replacement for 42MB disk, \$389); 60MB SCSI tape backup, \$1,049.

**In Short:** A speedy SCSI drive and fast video make this the performance leader among 80286 machines—even in the preliminary version that we tested. This machine is so well equipped that it almost cries out for an 80386 processor.

CIRCLE 6 ON READER SERVICE CARD

## ■ 20-MHz 286-BASED PCs

may be the best clone keyboard available. Its touch is positive, though slightly too loose for diehard IBM loyalists. It combines features of the old and new keyboard designs and adds a few twists of its own. The ten function keys from the old keyboard are on the left, with the Enhanced keyboard's F11 and F12 above them. The Ctrl, Shift, and Alt keys hold the positions that millions of users learned from IBM's PC, XT, and early-model AT. The cursor keys and the numeric keypad generally match the layout of IBM's Enhanced keyboard, but Northgate includes a much-needed extra Enter key on the number pad. Northgate will change the positions of some other keys on the keyboards it ships in December; the most welcome change will be the inclusion of an asterisk key below and to the right of the Period key. You will at last be able to type \*.\* without leaping across the keyboard.

Even in the preliminary form that we tested, Northgate's 286/20 SuperMicro stands out as the best-equipped 80286 computer I've ever seen. It almost seems a shame to shape such excellence around an 80286 processor. But if a superfast 286 is the machine you've been waiting for, Northgate is the computer to end your search.

### VECTOR COMPUTER CORP.

## Vector Excalibur 286

Vector Computer's Excalibur 286 doesn't much resemble the sword that King Arthur received from an arm mysteriously rising out of a lake, and I doubt that even the famous Merlin Utilities would have the magic needed to restore a hard disk that had spent a few millennia underwater. But the Excalibur 286 earns its name through its speed and power. It isn't immortal like Arthur's Excalibur, so in thoroughly modern fashion Vector provides 3 months of on-site service and a 1-year guarantee for parts and labor. Some of Arthur's knights would have found that useful after their final battle with Mordred.

This computer won't take up much room on your Round Table. The case fills a 13-by-15-inch footprint, and at 6½ inches high, it approximates the size of the IBM PS/2 Model 50. The front panel doesn't look like anything you've seen on



*The small-footprint Vector Excalibur 286 is offered with only EGA displays; add 1MB RAM, a 65MB hard disk, and DOS 3.3 and you'll pay \$3,775. The manual warns that one of the oscillators may come loose in shipping, and, true to prophecy, one did.*



a computer. It's a light tan rather than the standard beige and has oval buttons for the power, turbo, and reset switches. The general appearance is faintly reminiscent of a 1940s radio set.

The case has openings for three half-height drives, and there's no room for any additional hidden drives inside. Install a half-height hard disk, and you've got room for either two floppy disk drives or a floppy disk drive and a tape backup unit. A 200-watt power supply will handle anything you can fit into the case.

Our test sample came with a 65MB Microscience half-height hard disk attached to an Adaptec 1:1 interleaved RLL controller. This combination performed exceptionally well in the benchmark tests, equaled only by the SCSI drive in Northgate's 286/20 SuperMicro. Our sample also came with a TEAC 1.2MB floppy disk drive and an EGA card built around the Paradise chip set. With EGA monitor, this combination sells for \$3,775. The base model, with 512K RAM and no hard disk, costs \$2,295. Vector includes a copy

## ■ 20-MHz 286-BASED PCs

of DOS 3.3 with all of its models.

Vector's motherboard accommodates 256-kilobit or 1-megabit DRAMs. The bus speed is 8 MHz, switchable to 10 MHz. Our unit had 1MB of 80-nanosec-

ond 256-kilobit chips. Replacing these with 1-megabit chips would bring the motherboard memory up to 4MB. Ordinary AT memory cards can bring the total memory up to 16MB. The motherboard

incorporates one parallel and two serial ports, but the Vector design wastes two slot openings on the connectors. Vector may use separate knockouts on the back of the case in future units to avoid wasting slots.

The Harris 80286 on the motherboard was rated at 16 MHz, but Vector began shipping its machines with 20-MHz chips at the end of our review period. The Chips and Technologies chip set was rated at 16 MHz. The Award BIOS ensured a high level of compatibility. You can change processing speed from 20 to 10 MHz and back, either from the keyboard or from the turbo switch on the front panel.

Vector sent along the schematic of a forthcoming daughtercard that will let you pull the 286 chip and replace it with an 80386SX. It was too early for Vector to guess at the price or date of availability.

If you install more than 1MB of RAM in this computer, you can make it perform by using a supplied setup program to load the BIOS into shadow RAM and to interleave memory. The result is memory that operates at close to zero wait states. Although the machine comes with 80-ns. chips, 100-ns. DRAMs are adequate for upgrades.

Workmanship on the Excalibur is generally good, but an oscillator on the moth-

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## PC FACT FILE

**Vector Excalibur 286**  
Vector Computer Corp.  
7 Vernon St.  
Norwood, MA 02062  
(800) 634-6070 (outside Mass.)  
(617) 769-6714

**List Price:** With 512K RAM, 1.2MB 5¼-inch floppy disk drive, DOS 3.3, GW-BASIC, \$2,295; with 65MB hard disk, \$2,949; with 1MB RAM, 65MB hard disk, one floppy disk drive, EGA card and monitor, \$3,775. 1.44MB 3½-inch floppy disk drive, \$225.

**In Short:** A small-footprint machine with a high-performance hard disk. The only real limitation on this machine is its use of EGA rather than VGA. The warranty—with 3 months of on-site service—makes it a safe choice. A 386SX upgrade option is in the works.

CIRCLE 227 ON READER SERVICE CARD

## ■ 20-MHz 286-BASED PCs

erboard of the test machine was half out of its socket when it arrived in PC Labs. A supplement to Vector's manual warns of this possibility.

Vector's Enhanced-style 101-key keyboard, made by Chicony America, has a positive touch and would rank among the best of the keyboards tested if it weren't for its small Backspace key. But if you've grown accustomed to the small Backspace on the original AT keyboard, you won't mind this one. Vector's manual is a small, well-written, well-printed booklet with more than enough information for a moderately experienced user.

The most questionable choice that Vector made in putting together this computer is its inclusion of an EGA card rather than a

giant LED speedometer on the front panel. When you're running at 20 MHz, a big "20" shines out at you. When you throttle back to half speed it changes to "10." Once you grow tired of reminding yourself that you actually own a 20-MHz computer, you'll probably stick a Post-it note over those distracting lights.

Nothing else about this machine is likely to bother you. In testing, the Zeos performed near the top of the list in most memory and processor benchmark tests. On your desk, it's a sturdy AT-size case

with a sleekly sculpted front panel. You get pressure-sensitive turbo and reset switches on the front, along with a key-lock. On the back of the case are knock-outs for three large and three small ports in addition to the card slots.

Inside the case is a TMC motherboard showing excellent workmanship and finish. The motherboard has the now-standard complement of two 8-bit slots and six 16-bit slots. One of the 16-bit slots can double as a slot for a proprietary memory board with an additional connector to the

■ The most questionable choice Vector made is its inclusion of an EGA card rather than a VGA.

VGA (Vector does not supply VGA). Vector sent us a CTX EGA monitor that performed moderately well for an EGA. But there's no longer any good reason to restrict video to EGA in a new computer when VGA cards and monitors are only slightly more expensive.

If your desk is crowded and you want 5¼-inch drives, fast hard-disk performance, full upgrade options, and a full complement of expansion slots, the Excalibur is an obvious choice. Just don't fling it into the lake when you switch it off for the night.

### ZEOS INTERNATIONAL LTD.

#### Zeos 286/20

The only feature of the well-designed, well-constructed Zeos 286/20 that I can imagine complaining about is the one that will most attract some people to this computer. Following the example of audio marketers who know that amplifiers and tape decks with lots of flashing LEDs are always boffo in the showroom, Zeos puts a



*All-around solid workmanship, design, and performance make the Zeos 286/20 one of the best computers in the 20-MHz 286 group. At \$2,193 for a monochrome system with 1MB RAM and a 32MB hard disk, the Zeos is one of the least-expensive machines in this roundup. The LED speedometer on the front panel will never let you forget that you're running at 20 MHz (or 10 MHz, if you throttle down to half speed).*

## ■ 20-MHz 286-BASED PCs



### FACT FILE

#### Zeos 286/20

Zeos International Ltd.  
530 5th Avenue NW  
St. Paul, Minnesota 55112  
(800) 423-5891 (outside Minn.)  
(612) 633-4591

**List Price:** With 1MB RAM, 1.2MB 5¼-inch floppy disk drive, \$1,845; with 12-inch monochrome monitor, \$1,945; with 32MB hard disk, \$2,095. 42MB (40-ms.) hard disk, \$1,050; 42MB (28-ms.) hard disk, \$2,050; 40MB tape backup, \$499; 1.2MB 5¼-inch floppy disk drive, \$119; 1.44MB 3½-inch floppy disk drive, \$159; EGA card and 14-inch monitor, \$495; VGA card and 14-inch monitor, \$695. 80287-10 math coprocessor, \$299.

**In Short:** Excellent workmanship, solid and reliable design, and plenty of upgrade options make this one of the best all-round choices. Its hard disk performance lags slightly behind its high-speed memory and processing.

CIRCLE 10 ON READER SERVICE CARD

motherboard. The Zeos was the only machine we received already equipped with a Harris 20-MHz 80286. The chip set was a 16-MHz model by Chips and Technologies.

Zeos uses the Phoenix BIOS, offering elaborate setup options that let you load the BIOS into shadow RAM and speed up memory through interleaving.

Our sample machine came with 4MB of motherboard RAM in the form of 100-nanosecond DRAMs. Unless you found some thousand-dollar bills on the street recently, you'll probably start off with 1MB of RAM using 256-kilobit DRAMs. The proprietary memory board will allow a further 4MB of RAM that Zeos claims will operate at zero wait states. Ordinary AT memory boards let you pack the system with 16MB total memory.

Zeos's case has room for five half-height drives, two of them hidden behind the front panel. The test unit came with a Seagate 64MB hard disk, an Adaptec RLL controller, and a TEAC 1.2MB floppy disk drive. The disk performed on the slow side in most of the disk benchmark tests, and I would probably choose a different brand if Zeos offered one. But the only hard disks Zeos offers in sizes up to

120MB are Seagates; for 157MB to 676MB, Zeos offers Maxtor drives.

The system also included an 8-bit VGA card based on the Paradise chip set. The VGA card performed uninspiringly in the benchmark tests and failed the vertical blank interrupt compatibility test. Zeos supplied a Tatung VGA monitor.

Ask Zeos the price of its computers, and the company will send you a four-page listing of every possible option, with four columns of prices on each page. A fully configured model of the 20-MHz 80286 machine might include 1MB of RAM, a 32MB Seagate hard disk drive, 1.2MB floppy disk drive, serial and parallel ports, a Hercules-compatible monochrome card, Packard Bell amber monochrome monitor, and keyboard. That will set you back a very reasonable \$2,095. A small-footprint "baby AT" case cuts \$40 from the price.

You can order the machines without keyboard or video card at reduced prices. The test machine, which came with a 64MB hard disk, DOS 3.3, VGA, an 80287 coprocessor, and 3MB of additional RAM, would cost you \$4,583.

Zeos's standard warranty for this computer is 1 year on parts and labor, with a 30-day money-back guarantee. But if the

■ **The Zeos 286/20 machine combines excellent workmanship with reliable design—and makes them work at high speed.**

components in your machine are stamped as rated at 16 MHz rather than 20 MHz, Zeos extends the warranty to 2 years.

The Zeos 101-key Enhanced-style keyboard has a moderately positive touch, but it's nothing to type home about. It uses the original AT's half-size Backspace key. What makes this keyboard stand out from the competition is its tiny footprint. The keyboard frame extends less than an inch



### EDITOR'S CHOICE

#### • An 80386-based computer

*If you're looking for 20-MHz power and are willing to spend over \$3,000, why are you considering an 80286-based computer? It's true that buying a 20-MHz 286 in place of a 386 may save you a few hundred dollars now, but that's false economy. You'll miss out on 32-bit processing for virtual memory management; real, protected, and virtual 8086-mode processing; and upcoming 386 applications. And with 386 prices dropping every day, there's no excuse to be short-sighted.*

*If you really insist on a fast 286, any of these units is a reasonable choice. The Datavworld, Micro 1, Vector, and Zeos machines all are traditional AT-style designs that should provide good service; the Micro 1 Power 286-20 has a very slight edge in speed and flexibility. Dell's compact design for the System 220 unfortunately limits you to 3½-inch disks unless you buy an outboard 5¼-inch drive. The fast, ambitious Northgate 286/20 Super-Micro comes with an SCSI drive, but if you want a machine this powerful, it's time to admit to yourself that you really need a 386.*

beyond the keys themselves. The keys are full-size and are spaced as they are on other keyboards—no laptop miniatures here—but with it you discover room on your desk that you forgot you had.

The Zeos 286/20 machine combines excellent workmanship with reliable design—and makes them work at high speed. With more options than even the most custom-configuration-hungry hound could possibly need, tailoring your own Zeos is anything but a disappointing prospect.

*Edward Mendelson is a contributing editor of PC Magazine.*



"The Dateworld 286 [12MHz] AT compatible... [is]... the fastest machine of the nine tested in that review [July 1988]."  
 and  
 ... speed and excellent compatibility... hundreds of dollars less expensive than other AT compatible.



## EDITOR'S CHOICE

**NOW!**  
**20MHz 286**  
**SI = 22.5**

"Marvelously cheap, powerful alternative... outperformed the other 286's..."

(October 11, 1988)



### DATA-286 12MHz

80286 running at 8/12MHz, 0/1 wait state  
 Phoenix BIOS std. (Award BIOS opt.)  
 512KB of RAM, expandable to 1MB on board  
 Socket for 80287-8, -10  
 200W power supply  
 Real-time clock with battery backup  
 1.2MB floppy disk drive  
 Floppy/hard disk controller  
 (1:1 interleave controllers available)  
 101-key keyboard with "click"  
 Mono card w/parallel port (720x348)  
 TTL monitor with tilt/swivel base

**\$1195**



### Portacomp II

80286 running at 8/12MHz, 0/1 wait state  
 Phoenix BIOS std. (Award BIOS opt.)  
 512KB of RAM, expandable to 1MB on board  
 Socket for 80287-8, -10  
 Real-time clock with battery backup  
 1.44MB 3.5" floppy disk drive  
 20MB, 39ms, self-parking hard drive  
 102-key keyboard with "click"  
 Supertwist backlight LCD, 640x400 res.  
 RGB/monochrome output port  
 Weighs under 20 lbs.  
 1.2MB external floppy drive opt.  
 Carrying case available

**\$1975**



### DATA-286 20MHz

80286 running at 10/20MHz  
 AWARD BIOS std.  
 1MB of RAM, exp. to 2MB on board  
 EMS 4.0 support for memory over 1MB  
 Socket for 80287  
 200W power supply  
 Real-time clock with battery backup  
 1.2MB floppy disk drive  
 1:1 interleave floppy/hard disk controller  
 101-key keyboard with "click"  
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 Available for 286/386 models



### DATA-386

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 Floppy/hard disk controller  
 101-key keyboard with "click"  
 Five 16 and two 8-bit slots  
 Mono card and monitor **\$1995**



### Portacomp I

80286 10/12MHz, 0/1 wait  
 Phoenix BIOS std. (Award opt.)  
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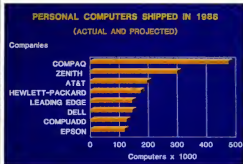
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- System and option ROM shadowing
- ROM-based setup
- Integrated Drive Electronics fixed disk drive interface
- Two serial ports and one parallel port, built-in
- Six 16-bit and one 8-bit expansion slots
- Math coprocessor support for 80387, Weitek, or both
- 29.2 on Norton's SI Benchmark 4.0 test

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- System and option ROM shadowing
- ROM-based setup
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- Six 16-bit and one 8-bit expansion slots
- Math coprocessor support for 80387, Weitek, or both
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- System and option ROM shadowing
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- 1MB RAM expandable to 5MB
- ROM-based setup
- IDE fixed disk drive interface
- Two serial ports and one parallel port, built-in
- Six 16-bit and two 8-bit expansion slots
- 80287 math coprocessor support
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- 80286-16 processor
- 16MHz and 8MHz switchable speeds
- 0 wait states (four-way interleave)
- 1MB RAM expandable to 5MB
- ROM-based setup
- IDE fixed disk drive interface
- Six 16-bit and two 8-bit expansion slots
- 80287 math coprocessor support
- 16.0 on Norton's SI Benchmark 4.0 test (18.0 rating with 2MB memory and four-way interleave)

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### CompuAdd 286/12

- 80286-12 processor
- 12MHz or 6MHz switchable speeds
- 0 wait states
- 512KB RAM expandable to 1MB
- Six 16-bit and two 8-bit expansion slots
- 80287 math coprocessor support
- 13.7 on Norton's SI Benchmark 4.0 test

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### CompuAdd 286/10

- 80286-10 processor
- 10MHz and 6MHz switchable speeds
- 512KB RAM expandable to 1MB
- Six 16-bit and two 8-bit expansion slots
- 80287 math coprocessor support
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	Monographics	EGA	VGA
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40MB	\$1699	\$2099	\$2259
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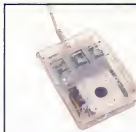
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■ UTILITIES ■ RON SAIDIKOWSKI

# ENVELOPES ON LASERS ARE EASY

*Here's a free utility that gives you the speed, ease of use, and most of the versatility of commercial envelope-printing programs, at a fraction of their RAM requirements.*

Why did you keep the typewriter when you bought the laser printer for your office? It wasn't so much for emergencies as for envelopes. Your printer has an envelope slot, of course, but a few vain attempts quickly showed that it was easier to retype names and addresses than it was to get your word processor to print them on the envelopes as well as on the letterheads.

I wrote ENVELOPE to put an end to this frustrating embarrassment. ENVELOPE is a memory-resident utility that captures the address from the PC screen and prints it on the envelope you feed through your laser printer. It can accommodate up to 6-line addresses, with as many columns as you have on your display. ENVELOPE will handle either small (No. 6, roughly 6 1/4 inches long) or large (No. 10, about 9 1/2 inches) envelopes, and it supports most laser printers that have either center- or edge-feed envelope guides. The printer can be connected to any of the standard ports, whether they are parallel or serial.

If desired, ENVELOPE will also print your return address. If you don't expect this to change, you can save it in the file copy of the program itself. You can always override this default later by entering a new return address either during installation or by executing ENVELOPE with a command-line switch at the DOS prompt.

**GETTING ENVELOPE** Details on how to download a ready-to-run copy of ENVELOPE.COM from PC MagNet are provided in the accompanying sidebar

"ENVELOPE by Modem." Both ENVELOPE.ASM, the assembly language source code, and ENVELOPE.BAS, a BASIC program that will create the .COM file for you automatically, are listed here. These files are also available for downloading from PC MagNet.

You can install ENVELOPE either at

the DOS prompt (before you load your word processor) or by putting the ENVELOPE command in your AUTOEXEC.BAT file. The full syntax is

```
[d:][path]ENVELOPE [/U] /Pxx /Ln [/R]
```

The drive *d:* and *path* are needed only if the program is not in a directory already on the path listed in your AUTOEXEC.BAT. The */Pxx* parameter sets the printer port. In place of *xx* you can enter L1, L2, or L3 for LPT1 (the default) through LPT3. If you use a serial printer, you can instead enter C1, C2, C3, or C4, to use COM1 through COM4. Although ENVELOPE supports printer output redirection (via the DOS MODE command), the use of the actual hardware port is recommended.

The */Ln* switch selects the printer model number: 1 is for the original LaserJet and LaserJet Plus, and 2 is for the LaserJet Series II (the default). If you have a printer that emulates the Hewlett-Packard LaserJet series, you should select */Ln* by the way you feed envelopes into your printer. Use */L1* if the envelopes go in along the bottom edge of a landscape page. If the envelope feed slot is in the center, the appropriate switch is */L2*. Remember to open the back hatch on Series II models so the envelopes will come out flat.

A sample installation for an original LaserJet attached to COM1 would be

```
ENVELOPE /L1 /PC1
```

The */R* switch lets you modify the return address. If you're using several switches, you should enter the */R* switch last. When entered on the ENVELOPE

## PRODUCTIVITY INDEX

### UTILITIES

An envelope-printing program that requires minimal RAM.

### ENVIRONMENTS

The mouse is an integral part of the OS/2 PM graphical interface.

### POWER PROGRAMMING

Here are OS/2 equivalents for ARG.C.ASM and ARGV.ASM.

### SPREADSHEET CLINIC

1-2-3 input/output commands let you write information to your computer.

### USER-TO-USER

Gain more hard disk space; extend your computer's life.

### POWER USER

Quick word counts in Word; create month names in a foreign language.

### LANGUAGES

Directly access the video buffer in Turbo C; sort large files in BASIC.

### PC TUTOR

Toggle the printer echo function; count command-line characters.

### CONNECTIVITY CLINIC

CD-ROM database is a network; learn IBM's LU 6.2 and APPC concepts.

## ■ UTILITIES

command line, either at the time of its initial installation or later, /R will display the return address currently contained in the .COM file. You can hit Enter to accept this, or you can type in a new return address. The new address will be used (unless you change it again) in the copy of ENVELOPE that remains resident until you reboot. The program accepts a three-line return address, with each line containing up to 40 characters. Blank lines—except for the first—are created by simply hitting Enter. If you need to start with a blank line, type a space and then Enter.

To make updating return addresses easier, a special feature of ENVELOPE al-

lows you to load them from a disk file. This property can be used to change addresses automatically using batch files and eliminates having to reenter an address change each time. Simply create an ASCII file containing the return address as the first three lines, and a fourth line that contains the answer to the question, "Save new ENVELOPE.COM?" A typical file might be called RETADR.TXT and would look like this:

```
Name
Address
City, State
N
```

To load the RETADR.TXT file, you

would type in the command

**ENVELOPE /R < RETADR.TXT**

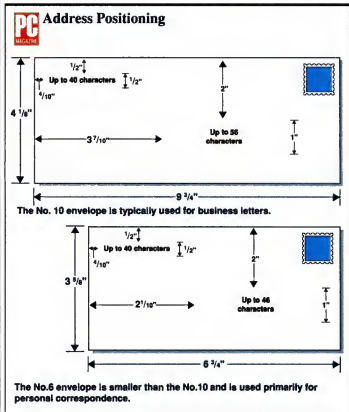
After entering a new return address (or accepting the default) you can save an updated copy of ENVELOPE.COM in your current directory simply by typing Y at the prompt. ENVELOPE either will install itself with your new return address or will update the current address if the program is already resident.

If ENVELOPE is the last-loaded of your TSR utilities, you can uninstall it by entering the command with the /U option. You'll want to do this if you need to change the port or printer model in use from those specified when ENVELOPE was originally installed. Instructions for altering the defaults are contained in the sidebar "Customizing ENVELOPE."

**USING ENVELOPE** Once installed, the first ENVELOPE menu is invoked by pressing Alt-E. Use the cursor arrow keys to position the cursor on the top-left corner of the recipient's name and address. (The menu will disappear at the first keystroke.) Hitting Enter then anchors the upper-left corner and displays a similar menu that tells you to move to the bottom-right corner of the address field. As you move the cursor, the field will be highlighted in reverse video. (Depending on the color scheme of your current application, portions may blink while highlighted, but the screen will be correctly restored upon exit.) If you move too far down or right, you can move back up or left to recover. If you mis-anchor the upper-left corner or decide not to print an envelope after all, pressing Esc will cleanly exit the routine.

You can use up to six lines for the recipient's name and address. There is no program limit on the length of these lines, but your envelope size will impose a practical maximum.

Once you've defined the address field, pressing Enter brings up the print menu. The diagram in Figure 1 illustrates how the return and the recipient's addresses are oriented on the two envelope sizes you can select. Press F1 to print on small (No. 6) envelopes, and F2 for the larger (No. 10) size. The size currently in effect is highlighted in the menu. If the RAdd field is highlighted, your return address will also



**Figure 1:** The ENVELOPE program positions the mailing address and optional return address differently depending on the envelope size. For the two standard sizes supported, the information will be placed in the shaded areas shown above.

```

PUSH      AX             ; Then interrupt back on
JH        AL,S80         ; get scan code
CMPL     AL,SCAN_CODE   ; compare scan code
JNE       INT9_3         ; if not, wait to old INT90H
MOV       AX,2           ; shift key status
RST       I40            ; NCR
AND       AX,0FFH        ;
CMPL     AL,SHIFT_MASK   ; compare shift status
JC        INT9_3         ; if yes, check if routine busy
POP       CX             ;
JMP       SMOCK_FPN CB:0000H ; look like an interrupt

; More checks before calling main ENVELOPE routine

INT9_3:    JMP     CB:0007H,8 ; NCR already active?
           CMPL     INT9_3 ; normal exit
           JB       AL,010 ; set keyboard
           MOV      AX,AL
           OR       AX,0FFH ; set bit 7
           OUT      $AN,AL ; send to control port
           MOV      AX,AL ; recover old value
           JMP      SMOCK_FPN $+2 ;
           OUT      $AN,AL ; send to control port
           CLI
           MOV      AL,30H ; reset the
           OUT      $B0,AL ; interrupt controller
           BTI
           PUSH     BX ; AX already pushed
           PUSH     CX
           PUSH     DX
           PUSH     SI ; Save all registers
           PUSH     DI
           PUSH     BP
           PUSH     BP
           PUSH     BP
           PUSH     CX ; established addressing
           POP       DX
           ASSUME   DS:CB00H ;
           INC      [SHIFT] ; set busy flag

; Get screen parameters -- part of test if interrupt on
=====
           MOV      AX,0FFH ; get video mode
           INT      I40 ;
           CMPL     AL,7 ; MCGM
           JE        NOBOOK ; regular 40 and 80 column modes
           CMPL     AL,1 ;
           JNE       NOBOOK ; graphics mode = wait
           MOV      [WIN_COLS],AX ; Number of columns
           DEC      AX
           MOV      [LAST_COLS],AX ; test column number
           MOV      [VID_PAGE],BX ; video page
           TEST     [STATUS],80A ; check if 80A (or VGA)
           JE        SET_LINES ; test 80A
           MOV      AX,AL
           MOV      BP,AX
           MOV      AL,BYTE PTR SI:[440H] ;
           MOV      [LAST_LINES],AL
           SET_LINES:  PUSH     CX ; set segment
           PUSH     DX ; for BP
           ASSUME   ES:CB00H ;
           GET_CURSOR ; get current cursor attributes
           MOV      [CURCOL],DX ; save cursor position
           CALL     ENVL_MAIN ; call main envelope routine
           MOV      BP,[CURCOL] ; send cursor location
           CALL     SET_CURSOR ; restore cursor
           DEC      BP ; envelope finished

INT90H_1:  ASSUME   DS:00010H,ES:00010H
           POP      AX
           POP      BP
           POP      BP
           POP      DX ;
           POP      DI ; restores all registers
           POP      BP
           POP      DX
           POP      CX
           POP      BX
           POP      AX
           INT8       ; return to Interrupted Routine

INT90H:    SMOCK
=====
; Main ENVELOPE Routine
=====
           ASSUME   CB:CB00H,DS:CB00H,ES:CB00H,SS:00010H

; Define address on screens
; Display upper left message and cursor is upper left
=====
           MOV      OFFSET_L ; initialize
           CALL     BLOCK_WINDOW ; place window on screen
           MOV      DX,00H ; upper left location
           CALL     SET_CURSOR ;
           CALL     GET_CHAR ; get character
           PUSH     AX ; save character
           CALL     BLOCK_WINDOW ; remove window from screen
           POP      AX
=====
; set text in window for lower right corner message
=====
           MOV      B1,OFFSET TEST_LOWER ; text for lower message
           MOV      D1,OFFSET NEXT_BLOCK+28 ; window location
           CALL     MOV TEST
           MOV      DI,OFFSET NEXT_BLOCK+5H ; window location
           MOV      TEST ; move 'right' message
=====

```

**ENVELOPE.ASM:** *The source code from which to assemble, link, and EXE2BIN the envelope-printing utility ENVELOPE.COM.*



# WordPerfect Office<sup>®</sup> gives your network the power of positive linking.

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CORPORATION

(ENVELOPE.ASM continued)



```

;-----
SET JMP OFF      EMDP
;-----
; set highlights in printer screen
;-----
SET_HILITE      PROC        NEAR
;-----
MOV             CX,3                ; 2 lines to reset
MOV             DX,HILITE_LOC      ; beginning location of small
PURSH          DX                   ; save
PURSH          BX,9                 ; save again
SET_H_LOOP:     PURSH          DX    ; save
TEST           SI,77h              ; normal video
CALL           SET_ATTRIB          ; set attribute byte
POP            DX                   ; small message
INC            DI                   ; next row
MOV             SET_H_LOOP
JMP            DE                    ; retrieve HILITE LOC
TEST          STATUS,BVH_HIKE_BIT   ; test for small
JP             SET_HIL_3           ; not set = small
INC            DI                   ; Large to be hilitied
MOV             BL,78h              ; reverse video
CALL           SET_ATTRIB          ;
POP            DI                   ;
ADD            DI,2                 ; location of "video"
TEST          STATUS,PB_RET_AND     ; test for print of ret-and
JB             SET_HIL_3           ; no print if 0
CALL           SET_ATTRIB          ; color should still be in BL
CALL           SVT_CURSOR          ; bury cursor
RET
;-----
SET_HILITE      EMDP
;-----
; set attributes - start at BK (cursor)
; change 5 attributes to BL
;-----
SET_ATTRIB      PROC        NEAR
;-----
PURSH          CX,9                ; attribute to set
CALL           SET_CURSOR          ;
MOV            AX,8                 ; read character
CALL           VIDEO_INT          ;
MOV            AH,9                 ; write character
MOV            CL,1                 ; one character
CALL           VIDEO_INT          ; attribute in BL
DEC            DL                   ; next position
POP            CX                   ;
LOOP           SET_ATT_LOOP         ; next character
RET
;-----
SET_ATTRIB      EMDP
;-----
NEEP            PROC        NEAR
;-----
PURSH          AX
INW            BH,BX*B'H            ; beep (ASCII ?)
INW            BH,NOR              ; NOR
SEV
RET
;-----
; call BIOS video INT function in AX
;-----
VIDEO_INT       PROC        NEAR
;-----
PURSH          BX
MOV            BH,VID_PAGE          ; page number
INT            10h                  ; BIOS video
POP            BX
RET
;-----
VIDEO_INT       EMDP
;-----
; bury cursor: 5 times BX
;-----
SVT_CURSOR      PROC        NEAR
;-----
MOV            CH,[LAST_LINE]
INC            DH
MOV            DL,EOL
; set cursor to position in DH DL
;-----
SVT_CURSOR      LABEL      NEAR
;-----
PURSH          AX
MOV            AH,A.3               ; set cursor
CALL           VIDEO_INT          ; BIOS video
POP            AX
SEV
;-----
; get cursor in DH [DH DL]
;-----
GET_CURSOR      LABEL      NEAR
;-----
PURSH          AX
MOV            AH,A.3               ; get cursor
JMP            VIDEO_CURSOR       ; BIOS video
;-----
VIDEO_CURSOR    EMDP
;-----
; get character from keyboard
;-----
GET_CHAR        PROC        NEAR
;-----
INR            AX,AX
INT            16h
MOV            AL,AX

```

(ENVELOPE ASM continues)

[illegible]

(continued)

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```

CHECK_4: JMP CHECK_1 ; continue with input
        CMP AL,"L" ; Check LJ Model input
        JNE CHECK_5
        CALL GET_MODEL
        JNC ATTEMPT_INSTALL ; if input correct
        JNC CHECK_1 ; continue with input
        AL,"N" ; input new return address
        JNE ATTEMPT_INSTALL ; no match
        CALL GET_RET_ADR
        JNC GET_RET_ADR

; Prompt for saving new Return Address to ENVELOPE.COM

CHECK_SAVE: MOV DS,OFFSET SAVE_TO_FILE
            MOV AL,9
            INT 21H
            MESSAGE
            CALL GET_CHAR ; get response
            MOV AX,1 ;DOS get char fn
            INT 21H ; allows for redirection
            AND AL,BILLIN ; capitalism
            CMP AL,"Y"
            JNE NO_RET_SAVE

; Save to file here - attempt to open file

MOV WORD PTR [START]
MOV AX,30H ;create file
MOV DS,OFFSET FILENAME ;name of ENVELOPE.COM
MOV CH,CH ;normal attribute
INT 21H
JNC SAVE_FILE_OK
JNC SAVE_FILE_ERR
MOV DS,OFFSET FILE_ERRORS
SHORT SAVE_FILE_ERR ; display string, proceed
MOV AX,48H ; file handle
MOV AX,48H ; write to file
MOV DS,OFFSET COM_SIZE - OFFSET CSEG - 180H ; bytes
MOV DS,180H
INT 21H
JNC SAVE_FILE_ERR ; DOS
MOV AX,30H ; close file handle
INT 21H
MOV DS,OFFSET FILE_UPDATES
CALL MESSAGE
MOV WORD PTR [START]

TEST STATUS,INSTALLED ; is ENVELOPE installed?
JE OK_INSTALL ; install
MOV SI,OFFSET RET_ADR ; name of ENVELOPE.COM
MOV SI,SI ; name offset
MOV AX,RESIDENT_SEG ; segment of installed ENVELOPE
MOV BX,AX ; destination
MOV CX,LENGTH_RET ; bytes to move
REP MOVSB
MOV DS,OFFSET RET_UPDATES
CALL MESSAGE
MOV AX,4C00H
INT 21H

; Final preparations for installation of ENVELOPE
; set printer model and port name in PRINT_SEG

OK_INSTALL: PUSH CS ; reset segment
            POP ES
            MOV SI,OFFSET MENU_PRINT+11H ; location for model
            MOV AL," " ; original LJ or LJ-
            TEST STATUS,LJ_MODEL ; check for LJ Series 2
            JE SET_MODEL ; LJ Series II
            MOV STATUS,AL ; Model in message
            MOV SI,OFFSET MENU_PRINT+12H ; location for port
            MOV SI,OFFSET PORT_NAMES ; location for name
            MOV AX,PRINT_PORT ; # through 6 LPT1 - COM4
            AND AX,63H
            MOV AL,AX
            INT 21H
            MOV SI,AX ; offset in memory in #1
            MOV SI,SI ; save location
            CALL NOW_TEST ; now test to video image
            MOV SI,SI ; location of port name
            MOV SI,SI ; location in message
            MOV SI,SI ; move 4 bytes

; check for DMA (or DMA) and set byte if present

MOV AX,120H ; special DMA function
MOV AL,10H ; return DMA information
INT 10H ; return video
CMP AX,10H ; if 10 unchanged then
JNE ENV_DMA ; no DMA or DMA
MOV STATUS,DMA ; set DMA bit

; Release environment block

ENV_REL: MOV BX,WORD PTR DS:[20H] ; environment block
        MOV BX,20H ; segment
        ASSUME ES:NOTHING
        MOV AX,49H ; free memory block
        INT 21H

; go resident

MOV AX,3509H ; get interrupt vector #9h
INT 21H ; DOS
MOV WORD PTR CLOSING,AX ; offset old interrupt #9h
MOV WORD PTR CLOSING,SI,AX ; segment for above

MOV DS,OFFSET INT95H ; new INT handler
MOV AX,2509H
INT 21H ; set interrupt vector #9h
; DOS

MOV DS,OFFSET INSTALLED ; installation message
CALL MESSAGE
MOV DS,OFFSET INSTALL ; save code up to INSTALL
INT 21H ; The infamous VBI interrupt

; attempt to uninstall ENVELOPE

UNINSTALL: TEST STATUS,INSTALLED ; first see if it is resident
            JNE UNINST_1 ; it is in memory
            MOV DS,OFFSET NOV_INTS
            CALL MESSAGE
            INT 21H
            MOV AX,3509H ; get segment of keyboard INT
            INT 21H ; DOS
            ASSUME ES:NOTHING
            CMP AX,RESIDENT_SEG ; segment of ENVELOPE
            JE UNINST_1 ; ok to uninstall
            MOV DS,OFFSET NO_UN_INTS
            MOV AX,4C00H
            INT 21H

; OR to uninstall

UNINST_1: MOV ES,RESIDENT_SEG ; segment of installed ENVELOPE
            MOV WORD PTR [START] ; don't confuse next install
            MOV ES:[CLOSING] ; old INT95 interrupt vector
            ASSUME ES:NOTHING
            MOV AX,3509H ; reset vector #9h
            INT 21H ; DOS
            MOV SI,49H ; free memory block in ES
            INT 21H ; DOS
            JC NO_UNINST ; error return
            MOV DS,OFFSET UNINSTALLED
            CALL MESSAGE
            MOV AX,4C00H
            INT 21H

INSTALL: ENDF

; Read port number from command tail #1 points to next character
; E4 characters left - CT set on return if error

GET_PORT: PROC NEAR
            CALL GET_NEXT_CH ; next character from tail
            JN G_ERROR_RET ; no character left
            AND AL,BILLIN ; capitalism
            CALL AL,"L" ; parallel port
            JNE GET_PORT_1
            CALL GET_NEXT_CH ; next character from tail
            MOV AL,"1" ; should be number
            CMP AL,2
            JNE GET_PORT_NUM ; carry set on error
            RET
            G_ERROR_RET: STC
            RET
            GET_PORT_NUM: MOV AX,AX ; port number in AX
            MOV PRINT_PORT,AX ; save port number
            CLC ; carry clear on normal return
            RET
            GET_PORT_1: MOV AL,"C" ; serial port
            CALL GET_NEXT_CH ; next character from tail
            MOV AL,"1" ; should be number
            CMP AL,2 ; COM4
            JNE G_ERROR_RET ; illegal input
            ADD AX,2 ; show port number in AX
            MOV PRINT_PORT,AX
            RET
            GET_PORT: MOV SI,SI ; need LJ Model type from command tail #1 points to next character
            ; E4 characters left - CT set on return if error

GET_MODEL: PROC NEAR
            CALL GET_NEXT_CH ; next character from tail
            MOV SI,SI ; no character left
            MOV AL,"1" ; should be number
            JN G_ERROR_RET ; illegal input
            MOV AX,MODEL ; clear model bit
            AND STATUS,NOT LJ_MODEL
            CLC
            RET
            GET_MODEL_1: MOV AL,1 ; illegal input
            JNE G_ERROR_RET ; illegal input
            OR STATUS,LJ_MODEL ; set model bit
            CLC
            RET
            GET_MODEL: ENDF

; set new return address from keyboard
; if CT set on return - then return address is not altered
; first display current return address

CURRENT_RET: MOV SI,SI ; "current address"
            ACCEPT_RET: DB "Enter new address (enter = no change).",CX,13
            DB "3 lines, 40 characters max."
            GET_RET_ADR: MOV DS,OFFSET CURRENT_RET
            CALL MESSAGE
            MOV DS,OFFSET RET_ADR

```

(ENVELOPE.ASM (continues))

[illegible]

778	DATA	B0	2	89	09	2	89	18	89	1	3C	0	74	39	656
779	DATA	C2	18	75	3	29	03	1	09	2	89	75	88	38	657
780	DATA	C2	18	75	3	29	03	1	09	2	89	75	88	38	658
790	DATA	FE	CA	88	09	3A	16	85	1	74	C4	FE	C2	88	659
791	DATA	FE	CA	88	09	3A	16	85	1	74	C4	FE	C2	88	660
810	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	661
820	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	662
840	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	663
840	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	664
840	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	665
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	666
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	667
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	668
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	669
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	670
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	671
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	672
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	673
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	674
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	675
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	676
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	677
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	678
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	679
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	680
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	681
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	682
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	683
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	684
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	685
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	686
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	687
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	688
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	689
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	690
860	DATA	B0	81	2	53	29	03	1	09	2	89	75	88	38	

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## CUSTOMIZING ENVELOPE

**Y**ou can modify several of ENVELOPE's defaults to reflect your specific needs or preferences. The hotkey combination can be changed by altering the variables `SCAN_CODE` and `SHIFT_STAT`, which are located in the `EQUATES` section at the top of the `ENVELOPE.ASM` source code listing. You would then assemble, link, and EXE2BIN the program. The hexadecimal values of the keyboard scan codes are shown in Figure A, and the shift status mask values are listed in Figure B.

If you are working with an already-assembled copy of ENVELOPE.COM, you can modify it using DEBUG. Make sure that you have ENVELOPE.COM, Version 1.0, and that the file is in your current directory. DEBUG must be in either the current directory or a directory in your PATH. The following example statement is a demonstration of how to change the default hotkey to Ctrl-X:

```

DEBUG ENVELOPE.COM
E 857 "CTL-X" ;Message
E 358 2D ;Scan code
E 362 84 ;Shift mask
W
O

```

Don't type the semicolons or the comments; they're just for your information. It's also a good idea to keep a copy of the original program just in case you make a mistake.

You can also set the printer model to default to an original LaserJet by entering a different byte for STATUS. (The description of the bits in the STATUS byte is shown in the .ASM listing; follow it carefully. For example, in order to change the defaults to use an original LaserJet, to print the return address, and to use small envelopes, make this change to ENVELOPE.COM:

```
DEBUG ENVELOPE.COM
E 940 2 ;STATUS byte
W
O
```

Similarly, you can choose a different default port by entering a new value for the word `PRINT_PORT`. To change to the COM1 port, for example, enter the following:

```
DEBUG ENVELOPE.COM
E 93A 1 ;Printer port
W
O
```

The most significant changes you

may decide to make to ENVELOPE's default values have to do with the spacing of the address that is to be printed on your envelopes. The top and left margin settings are based on limited experimentation on my part. You should experiment with these settings as well. Then if the re-

### SHIFT MASK Value Table

SHIFT MASK	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
AR											●	●	●	●	●	●
Ctrl							●	●	●	●			●	●	●	●
L-Shift					●	●			●		●	●		●	●	
R-Shift	●	●	●	●	●	●			●	●	●	●	●	●	●	●

SHIFT MASK Value ● — Pressed

**Figure 8:** The combination of shift keys needed to pop up the program corresponds to a unique `SHIFT_MASK` value in the `ENVELOPE.ASM` listing. You may substitute any of the values above for the default `Alt` key. Note that the listings above are in hex.

### Keyboard Scan Codes for Alternative Hotkeys

**Figure A:** If the hotkey combination used to activate the program is not to your liking, you can easily change the default to suit your preferences. First, select a new hotkey combination from the diagram above and then type in its scan code in place of the value shown for the `SCAN_CODE` variable in the `ENVELOPE.ASM` source code listing. You should note that the listings above are in hexadecimal numbers. Keep a copy of the original program in case you make a mistake.

sults and conclusions of your experiments are different from those of mine, especially if you have chosen a custom or an exotic format for your preprinted envelopes, you may want to modify the values that I have used for the margins. The margin settings are placed in the EQUATES section of the ENVELOPE .ASM program. Notice that the bytes of the margin settings are reversed and that ENVELOPE sends the character images rather than the numeric values to the printer.

To produce a distinctive address style, other landscape fonts (either cartridge or soft) could be used, but it is not practical to do this with DEBUG. If you're working with an assembler, however, you can just modify the FONT string to use the font that you desire from among the resources that are available to you. If you should request a font that you have forgotten to download, your laser printer will default to the closest landscape font that is available. —Ron Suidikowski

## ■ UTILITIES

ear piece of code that performs the functions of cursor movement, address definition, printer setup, and the actual print operation. Since the code is well documented, I'll present only an overview, with a few appropriate details. The install procedure, described below, initializes various messages and flags that are accessed from within ENVL\_MAIN.

All video operations are handled by BIOS interrupt 10h. This means that after the rows and columns are set, no check for adapter type is required. Further, no code is needed to prevent screen flicker. The BIOS video routines rely on the cursor position, which is generally communicated via the DX register, with the row number in DH and the column number in DL.

The procedure WINDOW swaps the command menus on and off the screen. WINDOW expects the upper-left screen location in DX, the number of rows in the menu in AX, the number of columns in CX, and the memory offset of the menu image in SI. The nested loops in this procedure exchange the current contents on the screen with the menu image in memory, one location at a time. Another call to the routine restores the screen and saves the menu image for later use.

You'll note that there is a slight asymmetry in the BIOS video routines. Function 8 reads the character and attribute from the current cursor location into AX (character to AL and attribute to AH). Function 9 writes the character in AL with the attribute in BL to the current cursor location. In addition, it requires the character count (in this case, 1) in CX.

The initial menu instructs you to move the cursor to the upper-left corner of the desired address and then hit Enter. The Arrow keys, Enter, and Esc are thus the only accepted entries. The procedure GET\_CHAR obtains keyboard input via BIOS interrupt 16h. The Arrow keys are extended codes, which are returned in AH with a zero in AL (since the standard BIOS calls for a normal keyboard are used). The routine GET\_JMP\_OFF processes these codes, returning a jump offset in DI. An illegal code causes the carry flag to be set on return. The cursor can thus be moved to any possible location on the screen. That location is saved in UPLEFT when Enter is pressed.

The next menu, a variant of the initial menu, tells the user to move the cursor to the bottom-right corner of the address field. As the cursor is moved, the address is highlighted in reverse video. This is done by changing the attribute bytes in the REVERSE procedure. As the original attributes will have to be restored, they are reversed exactly. As a consequence certain screen color combinations may, when highlighted, end up blinking or barely visible. Again the procedure GET\_JMP\_OFF decodes the Arrow keys, though this time

---

■ ENVL\_MAIN is a linear piece of code that performs the functions of cursor movement, address definition, printer setup, and the actual print operation.

---

the jump offsets are different. If Esc is pressed, the screen attributes are corrected before exiting. When Enter is pressed, the desired address is defined and ready to print.

The print menu is then swapped onto the screen. Now the only acceptable input characters are Esc, Enter, and function keys F1 through F3. F1 and F2 define the envelope size by setting or clearing bit 2 in the STATUS byte and by highlighting the appropriate word in the menu. F3 toggles printing of the return address, following a procedure similar to that for choosing the envelope size. The actual print operation is initiated by hitting Enter. After printing, the screen is returned to its initial state, which includes restoring the cursor to its original location. The BUSY flag is cleared, the registers are restored, and control is returned to the original application program.

The installation part of the code determines whether ENVELOPE has been previously installed, decodes and processes

the command-line switches, alters the return address if requested, displays appropriate messages, and finally installs ENVELOPE, if possible. Residency is determined by the time-honored method of searching memory for the program copyright notice. If ENVELOPE is already resident, a flag is set, the segment of this version is saved, and an appropriate message is displayed. Further operations can also test this flag, which is bit 7 in the byte labeled STATUS.

The actual decoding of the command-line switches in assembly language is a grueling task that deserves no further elaboration. I'll describe only the resulting operations. If /U has been entered, ENVELOPE attempts to uninstall itself. An appropriate bit in the STATUS byte is set to reflect the LaserJet model if /L is encountered, and the port to which the printer is connected (the value of the word PRINT\_PORT) is set on receipt of /P.

The /R option potentially requires the most work. The current return address (in the executable version of the program, which is not necessarily the one that is resident) is displayed, and the user is appropriately prompted. As currently coded, the return address comprises three lines of 40 characters each. Function 0Ah (Buffered Keyboard Input) of DOS interrupt 21h is called to process the input. Note that the string required by this function, located at the label ADR\_BUF, in fact consists of 43 bytes. The first byte is the size of the buffer (plus 1 byte for a carriage return). The next byte will contain the number of characters input, not counting the terminating carriage return. (This byte is tested for a zero following the requested user input to signal acceptance of the current return address.) The actual characters typed in are found beginning at ADR\_BUF+2.

As processing of the /R switch continues, the user is given the option of saving the current return address to ENVELOPE.COM, which makes it the default return address in subsequent installation requests. The save is executed using standard DOS file requests, and includes limited error checking. This means that the new copy of ENVELOPE.COM will be created on the current active drive and directory. The .COM file on-disk does not have the PSP (Program Segment Prefix), so



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## ■ UTILITIES

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Ron Saidikowski

1988 No. 22 (Utilities)

### Purpose:

A memory-resident utility that captures a name and address field from the screen and prints it, along with an optional return address, on an envelope fed into a laser printer.

### Format:

[d:][path]ENVELOPE [/U] /Pxx /Ln [/R]

### Remarks:

Entered without command-line parameters, ENVELOPE defaults to /PL1 (printer port LPT1) and /L2 (Laserjet II or compatible printer with center-feed envelope slot). Other values for xx are L2, L3, C1, C2, C3, or C4 (for LPT2, LPT3, and COM1 through COM4, respectively). The /L switch with a value of 1 for n is used for the older Laserjet or Laserjet Plus (or compatible), whose envelopes feed at the bottom of a landscape page.

The default Alt-E hotkey initiates the defining and printing process. The cursor keys are used to position the cursor on the upper-left corner of the name and address to be printed, and pressing Enter anchors it. The cursor keys are then used to define (highlight) the recipient's address field, which may be up to six lines deep and any displayable number of characters long. Pressing Enter then presents a choice between envelope sizes (F1 for small No. 6 envelopes or F2 for large No. 10s). F3 toggles a selection highlight between printing and not printing a return address. Pressing Enter then prints the envelope inserted into the laser printer's manual feed slot. At any point before printing starts, Esc can be used to exit.

The optional /R command-line switch permits storing a return address of up to three lines of 40 characters each. This address can be stored (and updated) as a permanent part of ENVELOPE.COM, if desired, or it can be used during a single session only. ENVELOPE.COM is normally installed via the user's AUTOEXEC.BAT file. If it is the last terminate-and-stay-resident utility loaded, it can be uninstalled at the DOS prompt by being invoked with the optional /U switch. Instructions for changing the hotkey and other defaults are given in the main article.

Available for downloading from PC MagNet (see the "ENVELOPE by Modem" sidebar), ENVELOPE.COM is already compiled and ready to run. ENVELOPE.BAS will automatically create ENVELOPE.COM when run once in BASIC. Creating ENVELOPE.COM from the ENVELOPE.ASM source code requires the use of a macro assembler (IBM or Microsoft, Version 2 or later) and the following commands:

```
MASM ENVELOPE;
LINK ENVELOPE;
EXE2BIN ENVELOPE ENVELOPE.COM;
```

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## ■ UTILITIES

times call OUT\_CHAR, which actually sends characters individually to the laser printer. OUT\_CHAR is called with the character to be printed in AL, and on return it signals error conditions via the Carry Flag. OUT\_CHAR first loads the port number, which is stored in the variable PRINT\_PORT, into DX. This register is used to communicate with the BIOS interrupts for both parallel and serial output. A value of 0, 1, or 2 corresponds to the parallel ports LPT1 through LPT3, respectively. In this case function 0 of interrupt 17h will send the character in AL to the parallel port whose number is in DX. Error codes are returned in AH. If bit 0 (timed-out), bit 3 (I/O error), or bit 5 (out of paper) is set on return, then OUT\_CHAR sets the carry flag before returning.

If the value in DX is 3 or greater, 3 is subtracted from DX so that it can correspondingly refer to the ports COM1 through COM4. In this case, function 1 of interrupt 14h is then called to send the

character in AL to the serial port in DX. An error is signaled if bit 7 of AH is set. (While writing ENVELOPE, I discovered that *The Peter Norton Programmer's Guide to the IBM PC*, p. 212, states that the service is successful if AH is 0 on return. Ray Duncan's *Advanced MS-DOS*, p. 429, correctly notes that success or failure is reported only in bit 7 of AH. I mention this because it took several iterations and a CodeView session to sort it out.)

The Hewlett-Packard LaserJet Series II printer is a masterpiece of design and production, but the earlier LaserJet and LaserJet Plus are somewhat lesser machines. In particular, the offset envelope feed on the earlier models can be finicky and may require frequent user assistance. Further, after an envelope is printed, the Manual Feed panel indicator light remains on, even though a subsequent print operation will function normally. (This panel light operation is noted in the HP *Technical Reference Manual*.) Paper jams are possible on all

models, most commonly when a sheet of paper from the feeder tray gets partially drawn into the printer after the envelope successfully prints. The only thing to do when this happens is to reposition the sheet correctly, turn off the printer, and then turn it on again.

**COMPATIBILITY** While I don't use many memory-resident programs, I have had no problems using ENVELOPE with those I've tried. It should be installed after DOS PRINT and any DOS MODE calls, but beyond this it's not particular about its location in memory unless you wish to uninstall it later. In that case, install it last.

ENVELOPE is useful in that it moves an additional chore to your Laser printer and eliminates the need to type addresses twice. Now if we could only do something about forms!

Ron Saidikowski is a computer hobbyist and first-time contributor to PC Magazine.

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■ ENVIRONMENTS ■ CHARLES PETZOLD

# THE MOUSE AND ITS MESSAGES

*Here's an explanation of how the mouse message system works, describing why the mouse is an integral part of the OS/2 Presentation Manager graphical interface.*



In the last Environments column I discussed why the mouse is an important part of a graphical windowing environment such as the OS/2 Presentation Manager. Methods of interaction between users and computers have been progressively evolving. We have moved from a purely teletype environment (in which the keyboard generates a data stream that is simply echoed on the display) through a full-screen character-mode environment (in which cursor keys are necessary to move to different areas of the display) to a graphical windowing environment.

The graphical windowing environment often involves a high density of on-screen information, including objects analogous to real-world objects, such as buttons and dials. In the real world, you use your fingers with these objects. In a graphical windowing environment, you use an extension of your fingers—the mouse. As you move the mouse on your desk, a small bit-map (called the mouse pointer) moves on-screen. You click (that is, press and release) a mouse button to signal an action on an object, or press and hold the mouse button to move or resize an object.

In this column we'll be looking at the Presentation Manager mouse from the programmer's perspective. That said, I suspect that your first question might be: What functions do you call to obtain input from the mouse?

But that's not the right question. Although the Presentation Manager includes some functions that let you determine where the mouse pointer is positioned and whether a mouse button is down or up, in

many cases you don't have to use these functions. Instead, you read mouse input by processing messages. There is no additional overhead involved with using the mouse in a Presentation Manager program; you don't have to "open" the mouse or do anything special. In fact, every Presentation Manager program you've seen in these columns has received mouse messages, but the programs chose to ignore them.

**INPUT EVENTS** The Presentation Manager supports two sources of user input—the keyboard and the mouse. These two devices generate what are called "input events." For the keyboard, an input event is the press or the release of a key. For the mouse, an input event is a mouse movement or the press or release of a mouse button.

The Presentation Manager translates keyboard and mouse input events into

messages. These messages are stored in a buffer called the message queue.

You may resist this terminology at first. Why call these things "messages"? How is the procedure different from what the BIOS does with keyboard input when you're running DOS? After all, the BIOS also processes keyboard input. It reads a scan code from the keyboard hardware, converts it into an ASCII (or extended ASCII) code, and stores it in a buffer. It's the same principle. Why confuse the issue with "messages" and "message queues"?

In fact, messages are different. Unlike input events, messages have an addressee, an intended recipient.

In a conventional environment, input events are addressed "to whom it may concern" or "to whoever pulls me out of the buffer first." But in a windowing environment, multiple programs are running on the same screen. Input events must be addressed to just one of these programs. An input event with a recipient becomes a message.

More precisely, a message in the Presentation Manager is addressed to a specific window. Presentation Manager programs always create one or more windows. Each window is associated with a window procedure that processes a message when the Presentation Manager calls the window procedure with parameters that identify the message.

**WHO GETS THE MESSAGE?** When the Presentation Manager translates an input event from the keyboard or mouse into

■ There is no additional overhead involved with using the mouse in a Presentation Manager program; you don't have to do anything special.



## ■ ENVIRONMENTS

a message, it must determine which window should get the message. Messages that come from a keyboard are handled quite differently from mouse messages in this respect.

Keyboard messages are addressed to the "focus window," also known as the window with the "input focus." Only one window can have the input focus at any time, and it's usually obvious to the user which window this is. The program that has the focus window is displayed in the foreground of all the other programs. As the user switches among programs running under the Presentation Manager, the focus window changes and is brought to the foreground. The focus window often indicates that it has the input focus by displaying a cursor of some sort.

Mouse messages are addressed to the window underneath the mouse pointer at the time of the input event. If several windows are overlapped on the screen, then the window in the foreground gets the mouse message. (There are some exceptions to this rule. A window can temporarily "capture the mouse" and get all mouse input. Or a window can allow mouse messages to pass through it to an underlying window.)

**A SIMPLE DEMONSTRATION** Let's look at some simple mouse processing in a program called MOUSEDemo. The three files needed to create MOUSEDemo.EXE are shown in Figures 1 through 3. MOUSEDemo displays the current x- and y-coordinates of the pointer position in the center of its client window.

Figure 4 shows three instances of MOUSEDemo running under the OS/2 Presentation Manager. The mouse pointer itself is the small arrow. The MOUSEDemo program also calls DosBeep to beep the PC's speaker when you press or release a mouse button.

As you can see, each instance of MOUSEDemo displays a different pointer position! This is because each instance of MOUSEDemo displays the pointer position relative to the lower-left corner of its client window.

The main function in MOUSEDemo.C contains the normal collection of function calls necessary to get the program started. For example, Presentation Manager pro-

grams always create a message queue by calling WinCreateMsgQueue. This queue is used for storing messages to all windows created in the same thread that created the message queue.

The WinCreateStdWindow function creates the collection of windows, which is known as the standard window. These windows include the title bar window; the system menu window (to the left of the title bar); the minimize/maximize window (to the right of the title bar); the sizing border window (which surrounds the window); the client window (the large interior area);

and the frame window, which holds all the other windows together.

Keyboard and mouse messages for all the windows that MOUSEDemo creates are stored in MOUSEDemo's message queue. A message is retrieved from the queue by a call to WinGetMsg, and it is dispatched to a window procedure with WinDispatchMsg. The Presentation Manager knows which window procedure to send the message to, because the recipient of the message is part of the message itself. The window procedures for the frame window, title bar window, system menu win-

```

#-----
# MOUSEDemo make file
#-----

mousedemo.obj : mousedemo.c
               cl -c -G2sw -W3 mousedemo.c

mousedemo.exe : mousedemo.obj mousedemo.def
               link mousedemo, /align:16, NUL, os2, mousedemo
  
```

Figure 1: The MOUSEDemo Make file shown above contains instructions for creating the MOUSEDemo.EXE file from the source code files.

```

/*-----
MOUSEDemo.C -- Demonstrate mouse message processing
(c) 1988, Siff Communications Co.
PC Magazine * Charles Petzold, 9/88
-----*/

#define INCL_WIN
#define INCL_GPI
#include <os2.h>
#include <stdio.h>
#define ID_TIMER 1

HRESULT EXPENTRY ClientWndProc (HWND, USHORT, MPARAM, MPARAM);
HAB hab;

int main (void)
{
    static CHAR szClientClass [] = "MouseDemo";
    HWND hmq;
    HWND hwndFrame, hwndClient;
    MSG msg;
    ULONG frameFlags = FCF_STANDARD & FCF_MENU;

    hab = WinInitialize (0);
    hmq = WinCreateMsgQueue (hab, 0);

    WinRegisterClass (hab, szClientClass, ClientWndProc, CS_SIZEREDRAW, 0);

    hwndFrame = WinCreateStdWindow (HWND_DESKTOP, WS_VISIBLE,
    szFrameFlags, szClientClass,
    "Mouse Demo",
    0, NULL, 0, hwndClient);

    while (WinGetMsg (hab, &msg, NULL, 0, 0))
        WinDispatchMsg (hab, &msg);

    WinDestroyWindow (hwndFrame);
    WinDestroyMsgQueue (hmq);
    WinTerminate (hab);
    return 0;
}
  
```

(continues)

Figure 2: The MOUSEDemo.C program displays the current pointer position in the center of its window. The main function has the normal collection of function calls needed to start the program.

```

VOID PaintWindow(HWND hwnd, HPS hps, SHORT xPointer, SHORT yPointer)
{
    static CHAR szBuffer[40];
    RECTL rc1;

    sprintf(szBuffer, "      Pointer Position = (%d, %d) ",
            xPointer, yPointer);
    WinQueryWindowRect(hwnd, rc1);
    GpSetBackColor(hps, WM_OVERPAINT);
    WinDrawText(hps, -1, szBuffer, rc1, CLR_SOLID, CLR_BACKGROUND,
               DT_CENTER | DT_VCENTER);
}

MESSAGEENTRY ClientWndProc(HWND hwnd, USHORT msg, WPARAM wpi, LPARAM lpi)
{
    static SHORT xPointer, yPointer;
    HPS hps;
    POINTL ptl;

    switch(msg)
    {
        case WM_CREATE:
            WinSetTimer(hwnd, WM_ID_TIMER, 1000);
            return 0;

        case WM_TIMER:
            WinQueryPointerPos(hwnd, DESKTOP, &ptl);
            WinMapWindowPoints(hwnd, DESKTOP, hwnd, &ptl, 1);
            xPointer = (SHORT) ptl.x;
            yPointer = (SHORT) ptl.y;

            hps = WinGetPS(hwnd);
            PaintWindow(hwnd, hps, xPointer, yPointer);
            WinReleasePS(hps);
            return 0;

        case WM_MOUSEMOVE:
            xPointer = MOUSEMSG(msg)->x;
            yPointer = MOUSEMSG(msg)->y;

            hps = WinGetPS(hwnd);
            PaintWindow(hwnd, hps, xPointer, yPointer);
            WinReleasePS(hps);
            break;

        case WM_BUTTONDOWN:
            DoBeep(256, 100);
            break;

        case WM_BUTTONUP:
            DoBeep(512, 100);
            return 0;

        case WM_BUTTONDOUBLECLICK:
            DoBeep(1024, 100);
            return 0;

        case WM_PAINT:
            hps = WinGetGpPaint(hwnd, NULL, NULL);
            GpErase(hps);
            PaintWindow(hwnd, hps, xPointer, yPointer);
            WinEndPaint(hps);
            return 0;

        case WM_DESTROY:
            WinSetTimer(hwnd, WM_ID_TIMER);
            return 0;
    }
}

return WinDefWindowProc(hwnd, msg, wpi, lpi);
}

```

(Figure 2 ends)

dow, minimize/maximize window, and sizing border window are located in the PMWIN.DLL dynamic link library. The client window's window procedure is called ClientWndProc and is located in MOUSEDEMO itself. ClientWndProc processes all messages to the client window.

This architecture is an extremely important part of the Presentation Manager. All of the messages to a window—regardless of where they originate—come through that window's window procedure. This means that keyboard and mouse messages are processed by essentially the same mechanism as timer and repaint messages.

**THE MOUSE MESSAGES** A message consists of four values, which are commonly known by the variable names `hwnd` (the handle of the window to which the message is addressed), `msg` (which identifies the message), and `mp1` and `mp2`, the two 32-bit message parameters. These message parameters contain information specific to the particular message.

When you move the mouse, the Presentation Manager creates a message for that input event. At first, this is in the form of a data structure of the type QMSG (queue message). The `hwnd` field is set to the handle of the window underneath the mouse pointer at the time the mouse was moved. The `msg` field is set to 112 for a mouse movement message. (Don't bother to memorize that value; the Presentation Manager header files have an identifier named `WM_MOUSEMOVE` that is equal to 112.)

The *x* and *y* positions of the mouse pointer, relative to the lower-left corner of the window, are combined into the *mpl* message parameter, with the *x*-coordinate in the lower half of *mpl* and the *y*-coordinate in the top half.

The message is initially stored in a system message queue and is then moved into a program's message queue. The `WinGetMsg` function uses a structure of the type `MSG` to read the message. When `WinGetMsg` returns, the fields of the structure are filled in with the next message from the queue. The `WinDispatchMsg` function dispatches the message to the window procedure for the window whose handle is stored in the `hwnd` field. This event causes the `Presentation Manager` to

```

=====
; MOUSEDEMO.DEF module definition file
=====

NAME                 MOUSEDEMO  WINDOWAPI

DESCRIPTION           'Mouse Demonstration Program (c) 1988, Siff Communications Co.'

PROTOSIZE            1024
HEAPSIZ              1024
STACKSIZE            #192
EXPORTS              ClientWndProc

```

**Figure 3:** The *MOUDEM0.DEF* module definition file contains information used by *LINK* in creating the *MOUDEM0.EXE* file.

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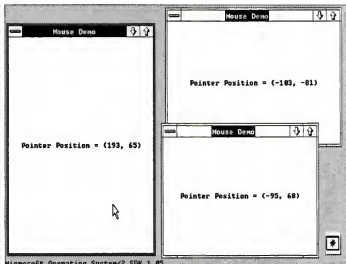


Figure 4: Three instances of MOUSEDemo running under the Presentation Manager.

call the window procedure with these four values as parameters.

In MOUSEDemo.C, ClientWndProc is the window procedure that processes messages to the client window. For the WM\_MOUSEMOVE message, ClientWndProc first stores the x- and y-coordinates of the mouse pointer (encoded in mp1) in static variables named xPointer and yPointer.

There are several ways by which a window procedure can extract the x- and y-coordinates from mp1. One way is to use two macros, SHORT1FROMMP and SHORT2FROMMP, defined in the Presentation Manager header files.

```
case WM_MOUSEMOVE:
    xPointer = SHORT1FROMMP (mp1);
    yPointer = SHORT2FROMMP (mp1);
```

But if you'd rather not remember that the coordinates are stored in mp1 (rather than mp2) and which coordinate is stored in the top half and which in the bottom half, the Presentation Manager header files also define a macro named MOUSEMSG, which makes the job a little easier:

```
case WM_MOUSEMOVE:
    xPointer = MOUSEMSG (msg) -> x;
    yPointer = MOUSEMSG (msg) -> y;
```

MOUSEDemo uses this latter approach.

After obtaining the coordinates of the

mouse pointer, MOUSEDemo calls WinGetPS to obtain the handle of the window's presentation space. This is necessary for writing to the window. The PaintWindow function in MOUSEDemo.C updates the display with the new mouse-pointer position.

Processing the WM\_PAINT message in MOUSEDemo.C is similar. A window procedure receives a WM\_PAINT message whenever part of the window has become invalid and must be repainted. The window is simply updated from the stored coordinates of the mouse pointer.

What happens when the user quickly moves the mouse pointer back and forth across the surface of a window? Does the Presentation Manager fill up the window's message queue with hundreds of WM\_MOUSEMOVE messages?

No, of course not. Unlike in the case with keyboard messages—where every keystroke is important to the program—it is not necessary for a program to receive every possible mouse movement message. In fact, mouse movement messages are put into the queue only as fast as a program can process them. If the mouse is moved, the Presentation Manager generates a WM\_MOUSEMOVE message and then checks the queue for an unprocessed

WM\_MOUSEMOVE message. If there is already a WM\_MOUSEMOVE message in the queue, the Presentation Manager simply replaces that message with the new message.

The Presentation Manager addresses a WM\_MOUSEMOVE message to the window underneath the pointer. Seen another way, a window procedure will receive WM\_MOUSEMOVE messages only when the mouse is positioned over its window. If you move the pointer outside of MOUSEDemo's client window, it stops receiving WM\_MOUSEMOVE messages and does not update its window.

To keep the window updated even when the pointer is outside the window, MOUSEDemo sets a timer by calling WinStartTimer. This timer posts WM\_TIMER messages every second. At each WM\_TIMER message, MOUSEDemo reads the current position of the mouse pointer by calling WinQueryPointerPos. However, the pointer coordinates obtained from this function are relative to the lower-left corner of the screen rather than the lower-left corner of the window. MOUSEDemo converts these coordinates into window coordinates by calling WinMapWindowPoints and updates the window just as it does during a WM\_MOUSEMOVE message.

The Presentation Manager supports a mouse with 1, 2, or 3 buttons. Each button can generate 3 different messages. When you press the first mouse button (the only button on a 1-button mouse, and the left button on a 2-button mouse), the message is WM\_BUTTON1DOWN. Releasing the button generates a WM\_BUTTON1UP message. If you press the mouse button again within a 1/2-second (the default value) of the first click, the Presentation Manager generates a WM\_BUTTON1DBLCLK (double click) message rather than another WM\_BUTTON1DOWN. The messages for buttons 2 and 3 follow the same pattern. MOUSEDemo processes WM\_BUTTON1DOWN, WM\_BUTTON1UP, and WM\_BUTTON1DBLCLK by calling DosBeep with frequencies of 256, 512, and 1,024 Hz, respectively.

**DEFAULT PROCESSING** When a window procedure does not choose to process a particular message, the message should

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be passed on to the WinDefWindowProc function for default processing. WinDefWindowProc ignores most messages, but it does not ignore WM\_BUTTON1DOWN and WM\_MOUSEMOVE.

When it receives a WM\_BUTTON1DOWN message, WinDefWindowProc calls the WinSetActiveWindow function to make the window active. This is part of the normal operation of the Presentation Manager: if a window is behind another window on the screen and you wish to bring the window to the foreground, you can do so by simply clicking with the mouse on any part of the window. The call to WinSetActiveWindow brings the window to the foreground.

If a program's client window processes a WM\_BUTTON1DOWN message and simply returns from the window procedure without calling WinSetActiveWindow,

### ■ The WinSetPointer

function allows you to change the shape of the mouse pointer.

then this normal operation of the Presentation Manager is effectively disabled. You won't be able to bring that program to the foreground by clicking with the mouse on its client window.

That's why MOUSEDEMO breaks from the WM\_BUTTON1DOWN case after it calls DosBeep. This results in the message being passed on to WinDefWindowProc. Alternatively, ClientWndProc could call WinSetActiveWindow itself and then return from the window procedure.

When it receives a WM\_MOUSEMOVE message, WinDefWindowProc calls WinSetPointer. This function sets the pointer to a particular shape. WinDefWindowProc uses this function to set the pointer to the default tilted-arrow shape. If you want a different mouse-pointer shape when the pointer is in your window, you can call WinSetPointer; MOUSEDEMO lets WinDefWindowProc do the normal default processing.

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I noted earlier that WinCreateStdWindow creates several windows: the frame window, title bar window, system menu window, minimize/maximize window, sizing

border window, and client window. Each of these windows responds to mouse messages in a different way. The title bar window allows you to move a window to another part of the screen using the mouse.

The sizing border window lets you resize the window by pulling the border. The system menu window displays a drop-down menu when it is clicked with the mouse. Clicking the minimize/maximize window causes the active window to be maximized to fill the whole screen or minimized to an icon.

Different types of windows respond to mouse messages in different ways, because each type of window has a different window procedure. It's the window procedure that processes the mouse messages and decides what to do with them.

The Presentation Manager directs mouse messages to the window underneath the mouse pointer at the time of the input event. Think of a window as an object on the screen. When the user points at or clicks one of these objects with the mouse, the Presentation Manager sends the mouse message to the object, or (more precisely) to the window procedure for that object.

This means that "hit-testing"—that is, determining what the mouse pointer is pointing at—is built into the architecture of



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■ WinCreateStdWindow creates several windows that respond to mouse messages differently.

the Presentation Manager. A program doesn't have to determine whether the mouse pointer is on the title bar or the system menu or the sizing border, because the mouse message goes to the window procedure of the window that the pointer is on. When the title bar window procedure gets a WM\_BUTTON1DOWN message, the window procedure knows that the user pressed the mouse button while the pointer was over the title bar.

When the user points at an object with the mouse and presses a button, the user has a sense of sending a message to that object. Amazingly enough, that is exactly what is happening within the Presentation Manager and the program.





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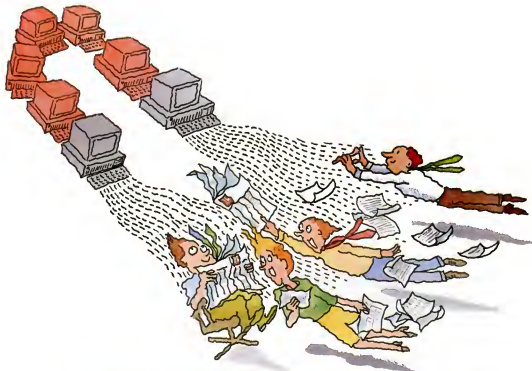


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# PARSING COMMAND LINES IN OS/2



*Whether you're for or against OS/2, you can't afford to ignore its existence. Here are OS/2 equivalents for the previously published ARGV.ASM and ARGV.ASM subroutines.*

Along with many of you, I've been closely following Charles Petzold's introduction to OS/2 and the Presentation Manager in his Environments column, and I've been listening carefully to the arguments pro and con presented by other PC Magazine editors and columnists. I've been writing OS/2 programs for 2 years (since its Alpha version days), and I admire its design and capabilities.

I'm not, however, ready to join either the "DOS Is Dead" or the "DOS Forever" school of thought. I think it quite likely that OS/2's 80386 and 80486 successors will eventually eclipse MS-DOS, but I suspect this will take a lot longer than anyone now imagines—perhaps 10 years or more. In the meantime, there's still a lot of important, money-making work for MS-DOS programmers.

Nevertheless, long before OS/2 becomes a potent force in the user marketplace, it will be an important consideration in the programmer marketplace. Indeed, it already is one: my own company, which sells a particularly specialized programming tool, has been shipping equal numbers of the OS/2 and MS-DOS versions for the last several months. This is evidence that many programmers are at least exploring the possibilities of OS/2, even if they are not yet using the system for production work.

As a result of this totally unaudited and somewhat offbeat market research, I've decided that it's time to give OS/2 some attention in this column. From now on, whenever I present a C or MASM tool that is environment-dependent, I will provide

versions for both MS-DOS and OS/2. This will not only address the needs of OS/2 programmers but will allow those of you who have adopted a "watch and wait" policy on OS/2 to draw your own conclusions about the new system.

My plans for upcoming columns include a series on memory management (especially heap management), additional sorting routines, a simple floating-point package, and indexed file management tools. First, however, I want to clean up some loose ends by presenting OS/2-specific routines to match the MS-DOS-specific tools that have already appeared in Power Programming over the last year. The coverage here will be quick and practical, since Mr. Petzold has already covered general OS/2 concepts such as the Application Program Interface (API) and dynamic linking. If you missed his columns on these subjects, I suggest you go back and read them.

■ Long before OS/2 becomes a potent force in the user marketplace, it will be an important consideration in the programmer marketplace.

## OS/2 COMMAND-LINE PARSING

I'll start out with OS/2 command-line processing. This is a particularly important subject because the tools we programmers write for our own use are often invoked from a batch or Make file, and therefore they must be able to work in a noninteractive mode.

Before proceeding, let's review a little terminology. The *command line* is the line entered by the user to run a program. It contains the name of the program, followed (optionally) by other parameters separated by spaces, tabs, or other delimiters. It is terminated with a carriage return (the Enter key on IBM PCs). The *command tail* is what remains of the command line after the program name and any redirection or piping parameters have been removed. Each filename, switch, or other parameter in the command tail is called a *command-tail argument*.

In the December 22, 1987, installment of Power Programming, I discussed the `argc` and `argv[]` parameters provided to a C program's `main()` routine by the C start-up code. These parameters give a C program access to its command-line arguments. In that same issue, I published two assembly language subroutines, `ARGC.ASM` and `ARGV.ASM`, that provide similar capabilities to an assembly language application: `ARGC` returns the total number of command-line arguments (including the name of the program itself), and `ARGV` returns the address and length of a specific command-line argument.

As you know, DOS places the command tail for a program at offset 80h in its

## ■ POWER PROGRAMMING

```

0000  8 1 2 3 4 5 6 7 8 9 A B C D E F 8123456789ABCDEF
0001  33 58 42 4F 58 3D 63 3A 5C 6F 73 32 73 79 73 5C 3BX0X=C:\os2sys\
0002  63 6F 6D 60 61 6E 64 2E 63 6F 6D 88 43 4F 4D 53 command.com.COME
0003  58 45 43 3D 43 3A 5C 4F 53 32 53 59 53 5C 4D PEC=C:\OS2SYS\CM
0004  4A 2E 45 58 45 88 58 51 54 58 4D 43 3A 5C 38 43 D.EXE.PATH=C:\C
0005  3A 5C 4F 53 32 53 59 53 38 43 3A 5C 4F 4F 4C S.DPATH=C:\C\O
0006  53 32 53 59 53 38 43 3A 5C 54 4F 4F 4C 53 88 49 82SYS=C:\TOOLS.I
0007  4E 43 4C 55 44 45 3D 63 3A 5C 69 6E 63 6C 75 64 INCLUDE=\\includ
0008  65 88 4C 49 42 3D 63 3A 5C 69 62 88 49 4E 49 e.LIB=C:\Lib.LIB.I
0009  54 3D 63 3A 5C 69 6E 69 74 88 54 4D 58 4D 3D 3A T=\\init.TMP=C:
0010  74 65 6D 78 88 58 52 4F 4D 58 54 3D 24 78 24 5F 58 4D mp.PROMPT=$PS PM
0011  24 67 88 88 43 3A 5C 5F 4D 46 5C 46 49 4E 44 2E $g..C:\PMP\FIND.
0012  45 58 45 88 66 69 6E 64 88 28 2F 6E 28 22 65 78 EXE.find. /n "ex
0013  74 72 6E 22 28 73 74 61 72 74 2E 61 73 6D 88 88 trn" start.asm..

```

Figure 1: This is a sample hex dump of the information passed to an OS/2 program at entry. The OS/2 FIND utility was run with the command line: C>find /n "extrn" start.asm <Enter>. This results in FIND.EXE being loaded with this environment block, a fully qualified filename at offset 00C4H, and a set of argument strings beginning at offset 00D4H.

program segment prefix (PSP) in the following form: a byte containing the length of the command tail followed by the text of the command tail itself and ended with a carriage return (0Dh) that is not included in the count. A .COM-type program is entered initially with all four segment registers pointing to the PSP, and these registers typically remain unchanged throughout a .COM program's execution; access to the command tail is, therefore, very easy.

A DOS .EXE-type program is entered with segment registers DS and ES pointing to the PSP, but in order to do useful work,

the program must save this address and then reset DS (and usually ES) to point to its data segment. Access to the command-tail arguments is accordingly more clumsy for .EXE programs. (Alternatively, in DOS versions 3.0 and later, interrupt 21h function 62h can be called to get the PSP address. I do not, however, feel that it is worth the trouble of including special code just to use this function when it is available.)

OS/2 presents application programs with the command-line arguments in quite a different manner. The carriage return is

stripped off the command line and two null bytes are appended; then an additional null byte is inserted between the program name typed by the user and the command tail. Looked at another way, we have an argument strings block that looks very much like an environment block: two ASCII strings, followed by an extra null byte that indicates the end of the block. OS/2 appends this argument strings block to the program's environment block and the ASCII fully qualified pathname.

When OS/2 enters an application program for the first time, it passes the selector for the program's environment in register AX and the offset of the argument strings in register BX. The program can either save these addresses or retrieve the same information later from OS/2, with the function call DosGetEnv. Execution times are not of much concern here because inspection of command-tail arguments is usually done only once or twice in a program. A hex and ASCII dump of the data passed to an actual OS/2 program is shown in Figure 1.

Once the selector and offset for the argument strings block is in hand, counting the arguments and locating a specific argument is no more difficult than it was under MS-DOS. In fact, the OS/2 versions of the ARGV.ASM and ARGV.ASM routines

```

; ARGV.ASM: Return count of command line arguments.
; Treats blanks and tabs as whitespace.
; Copyright (c) 1988 Siff Communications Co.
; PC Magazine + Key Success + 12-31-88
; Call with:  N/A
; Returns:   AX = argument count (always >=1)
; Errors:   nothing (other registers preserved)
;-----
; .386
tab equ 09h ; ASCII tab
blank equ 0Ah ; ASCII space character
entry DosGetEnvVar
_TEXT segment word public 'CODE'
argmax csi_TEXT
public arg ; make ARGV available to linker
; local variables
cseg equ [bp-2] ; environment segment
cend equ [bp-4] ; command line offset
arg proc near
enter 4,0 ; make room for local variables
push ax ; save original BX, CX, and CX
push bx
push cx
push ax ; get selector for environment
mov ax, cseg
push ax

```

```

push ax
lea ax, cendoff
push ax
call DosGetEnv ; transfer to OS/2
or ax, ax ; check operation status
mov ax, 1 ; force arg >= 1
jmp arg3 ; inexecutable failure
mov ax, cseg ; set SS:AX = command line
mov bx, cendoff
arg0: inc bx ; ignore useless first field
cmp byte ptr ax[bx], 0
jnz arg1
arg1: mov cx, 1 ; set flag = outside argument
arg2: inc bx ; point to next character
jnz byte ptr ax[bx], 0
arg3: jmp ; set if null byte
cmp byte ptr ax[bx], blank
jnz arg1 ; outside argument if ASCII blank
cmp byte ptr ax[bx], tab
jnz arg2 ; outside argument if ASCII tab
; otherwise not blank or tab,
; jump if already inside argument
inc ax ; also found argument, count it
or ax, 1 ; set flag = inside argument
and look at next character
arg3: pop cx ; restore original SS, CS, ES
pop bp
pop ax
leave
ret ; discard local variables
; return AX = argument count
arg endp
_TEXT ends

```

Figure 2: An OS/2 version of the Power Programming library ARGV.ASM subroutine, which returns the number of command-tail arguments.

```

; ARGV.ASM: Return address and length of specified
; command line argument or fully qualified
; program name. Treats blanks and tabs
; as whitespace.
;
; Copyright (c) 1988 Biff Communications Co.
; PC Magazine v Ray Dutton v 12-27-88
;
; Call with: AX = argument number (0 based)
;
; Returns: ES:BX = argument address
;          AX = argument length (0=no argument)
;
; Uses: nothing (other registers preserved)
;
; Note: if called with AX=0 (argv[0]), returns ES:BX
; pointing to fully qualified program name in environment
; block and ax=length.
;-----
.286
tab equ 09h ; ASCII tab
blank equ 20h ; ASCII space character

extern DosGetEnvVar

_TEXT segment word public 'CODE'
assume cs:_TEXT

public argv ; make ARGV available to linker
; local variables...
soring equ [bp-2] ; environment segment
cndoff equ [bp-4] ; command line offset

argv proc near
    enter 6,0 ; make room for local variables
    push cs ; save original CX and DI
    push di

    push ax ; save argument number
    push ax ; get selector for environment
    lea es,soring ; and offset of command line
    push ax
    push ax
    lea es,cndoffs
    push es
    call DosGetEnvVar ; transfer to cx/2
    or ax,ax ; test operation status
    pop ax ; restore argument number
    jmp if DosGetEnvVar failed
    mov es,soring ; set ES:BX = command line
    mov bx,cndoffs

    or es,ax ; is requested argument=0?
    ja argv4 ; yes, jump to get program name

    argv1: inc bx ; scan off first field
    cmp byte ptr es:[bx],0
    jae argv4

    argv1: mov ax,bx ; initialise argument counter
    mov cx,-1 ; set flag = outside argument

    argv2: inc bx ; point to next character
    cmp byte ptr es:[bx],0
    je argv3 ; wait if null byte
    cmp byte ptr es:[bx],blank
    je argv1 ; outside argument if ASCII blank
    cmp byte ptr es:[bx],tab
    je argv1 ; outside argument if ASCII tab
    jccoe argv2 ; if not blank or tab...
    jmp if already inside argument

    inc ax ; size count arguments found
    cmp ax,41 ; is this the one we're looking for?
    jne, go find its length
    ; yes, go find its length
    mov cx,0 ; no, set flag = inside argument
    and look at next character
    jmp if found and if ASCII blank
    cmp byte ptr es:[bx],tab
    jae argv1 ; found end if ASCII tab

    argv4: mov ax,bx ; set ES:BX = argument address
    mov es,es ; and ax = argument length
    ret 4 ; return to caller

    argv7: mov ax,0 ; set ax = 0, argument not found
    jmp argv4 ; return to caller

    argv8: xor di,di ; special handling for argv=0
    xor ax,ax ; find the program name by
    mov cx,-1 ; first skipping over all the
    ; environment variables...

    argv9: repne scasb ; scan for double null (can't use
    scasd ; because above might be odd addr.)
    jne argv9 ; loop if it was a single null
    mov bx,di ; save program name address
    mov cx,-1 ; now find its length...
    repne scasb ; scan for another null byte
    mov cx,di ; convert cx to length
    dec cx

    argv10: mov es,cx ; return length in es
    mov ax,ax ; common wait point
    pop cx ; restore original CX and DI
    leave ; discard stack frame
    ret 4 ; return to caller

    argv endp
_TEXT ends

```

Figure 3: A similar OS/2 version of the ARGV.ASM subroutine, which returns the address and length of a specific command-tail argument.

are somewhat cleaner than their MS-DOS counterparts, since the interface to the application can be simpler; ARGV and ARGV need not rely on addresses passed by the caller, because DosGetEnv is always available.

The OS/2 version of ARGV in Figure 2 requires no parameters and returns the total number of command-tail arguments in register AX. Multiple tabs and blanks are treated as a single separator between arguments. For symmetry with C, the value returned is always at least 1; that is, ARGV counts the program name as the first argument.

The OS/2 version of ARGV in Figure 3 is passed only a zero-based argument number in AX. (Compare this with the MS-DOS version, which also requires the command-tail address in registers

ES:BX.) ARGV returns a pointer to the specified argument in ES:BX, with the length of the argument in AX. If the argument is not present—if ARGV is called with AX greater or equal to the value returned by ARGV—zero is returned in AX and registers ES:BX have no meaning. The ARGV routine contains special code for the "zeroth" command-line argument—equivalent to argv[0] in a C program. The ARGV routine returns a pointer to the fully qualified program name that follows the program's environment rather than the first argument string.

Notice that, in contrast with MS-DOS functions, which are actuated through software interrupts and pass parameters in registers, OS/2 API functions are requested through a far call to a named entry point. Parameters are passed on the stack, along

with the addresses of variables within the calling program's data segment that will receive any results returned by the function. The status of an operation is returned in register AX: zero if the function succeeded, an error code otherwise; all other registers are preserved.

You should also notice how, instead of using statically allocated variables in the data segment, ARGV and ARGV allocate and deallocate working variables on the stack with the ENTER and LEAVE instructions. OS/2 subroutines should always be designed for reentrancy so that they can be shared among multiple threads of execution in the same process.

**ARGC AND ARGV ROUTINES**  
The program SHOWARGS.ASM in Figure 4 demonstrates the OS/2 ARGC and



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## ■ POWER PROGRAMMING

```

; SHOWWARGS.ASM - demonstrate command line parsing with ARG0.ASM and ARGV.ASM
;
; Copyright (c) 1988 Biff Communications Co.
; PC Magazine - Ray Duncan

.286

stdin equ 8 ; standard input handle
stdout equ 1 ; standard output handle
stderr equ 2 ; standard error handle

cr equ 0Ah ; ASCII carriage return
lf equ 0Ah ; ASCII line feed
blank equ 20h ; ASCII blank
tab equ 09h ; ASCII tab

extrn argvcount ; returns argument count
extrn argvpointer ; returns argument pointer
extrn _doswrite ; OS/2 API function
extrn _doswrite ; write file or device
extrn _dosexit ; terminates process

DOSGROUP group _DATA
_DATA segment word public 'DATA'

curarg dw 0 ; current command line argument
totargs dw 0 ; total command line arguments
vlen dw 7 ; bytes actually written

msg1 db cr,lf,"The command line contains "
msg1_len equ $-msg1
msg2 db cr,lf,"argument "
msg2_len equ $-msg2
msg3 db "xx is:"
msg3_len equ $-msg3

_DATA ends

;-----
; NEXT segment word public 'CODE'
; assumes cs:TEXT,ds:DOSGROUP
main proc far ; entry point from OS/2

call argp ; get and save number of
mov totargs,ax ; command line arguments

mov bx,offset msg1a ; convert argument count
call h2dec ; to ASCII for output

push stdout ; display argument count
push ds ; standard output handle
push offset DOSGROUP:msg1 ; address of message

push msg1_len ; length of message
push ds ; receives bytes written
push offset DOSGROUP:write ; transfer to OS/2
mov ax,curarg ; now get actual argument
call argv ; 30:30=addr,ax=length

push stdout ; standard output handle
push 0 ; command argument address
push ax ; command argument length
push ds ; receives bytes written
push offset DOSGROUP:write ; transfer to OS/2
inc word ptr curarg ; go to next argument
jmp msg1

msg2: push 0 ; terminate process
; return mode = save
call _dosexit ; final wait to OS/2

;-----
; convert binary 0-99 to decimal ASCII with
; AL = binary data, BX = addr. for 2 chars.
h2dec proc near

asm
mov ax,"99" ; divide AX by 10, leaving AH=quotient, AL=remainder
add [bx],ah ; convert to ASCII
mov [bx+1],al ; store two's digit
ret ; return to caller

h2dec endp

;-----
NEXT ends
end main ; defines entry point

```

Figure 4: SHOWWARGS.ASM is the source code for an OS/2 version of SHOWWARGS.EXE, which demonstrates the ARG0 and ARGV routines.

ARGV routines; it is very similar to MSDOS SHOWWARGS.ASM that was previ-

```

NAME SHOWWARGS WINDOWCOMPAT
PROTMODE
STACKSIZE 4896

```

Figure 5: The module definition file SHOWWARGS.DEF is required when linking the protected-mode program SHOWWARGS.EXE. The optional WINDOWCOMPAT parameter indicates that the program can run in a window under the OS/2 Presentation Manager.

```

showwrgs.obj : showwrgs.asm
masm /xi /T showwrgs;

argv.obj : argv.asm
masm /xi /T argv;

argc.obj : argc.asm
masm /xi /T argc;

showwrgs.exe : showwrgs.obj argv.obj argc.obj showwrgs.def showwrgs
link /CO showwrgs+argv+argc,,,os2,showwrgs

```

Figure 6: The Make file for the OS/2 version of SHOWWARGS.EXE.

ously published in this column.

To build SHOWWARGS.EXE, first make sure that the dynamic link import library OS2.LIB (or DOSCALLS.LIB) is available in one of the directories named in your LIB= environment string. This library is used to satisfy extrn declarations of OS/2 API functions. Then gather together the OS/2 versions of ARG0.ASM, ARGV.ASM, SHOWWARGS.ASM, and the module-definition file SHOWWARGS.DEF, shown in Figure 5, into the same directory and enter the following lines:

```

C:\MSH\SHOWWARGS;
C:\MKN\ARGV;
C:\MKN\ARG0;
C:\LINK SHOWWARGS+ARGV+ARG0,,,OS2,SHOWWARGS;

```

When you invoke the SHOWWARGS program, it displays the number of command-line arguments (including the program name), and then it lists the arguments individually. For example, if you enter the command

```

C>SHOWWARGS BARK HISS QUACK

```

you will see

```

The command line contains 04 arguments
Argument 00 is: C:\PC\MAG\SHOWWARGS.EXE
Argument 01 is: BARK
Argument 02 is: HISS
Argument 03 is: QUACK

```

If you prefer, you can use the Make file shown in Figure 6 to automate the construction of SHOWWARGS.EXE.

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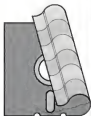
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*Learn how to use Lotus 1-2-3 file I/O commands to write information to your screen. Using ANSI sequences, we'll show how to move the cursor, style your display—or erase it.*

## Using file I/O routines to write information to your computer screen

Lotus 1-2-3's macro commands for file I/O ({Open}, {Write}, {Read}, {Close}, and so forth) were designed to let you write information from a 1-2-3 worksheet into a text file and read information from a text file into a 1-2-3 worksheet. However, you also can use them to write information to the screen of your computer. With the help of ANSI escape sequences, you can position the cursor on the screen, assign colors and attributes to the text you write, and erase all or part of the text on the screen.

In this issue, we'll explain and demonstrate how you can use file I/O commands to write information to the screen of your computer.

**WRITING TO THE SCREEN** To use 1-2-3's file I/O commands to write to your screen, you must specify the DOS device name CON as the name of the file to which you will write information. CON stands for console. When DOS is reading information, the console is the keyboard; when it is writing information, the console is the screen. Consequently, the command

```
{Open CON,W}
```

opens your screen for writing purposes.

Once you have opened the screen, you can send it four kinds of instructions using the {Write} and {WriteLn} commands: what characters to display, where to display them, the style and color in which to

display these characters, and whether to erase all or part of the screen. Writing characters is simple; moving the cursor, styling the display, and erasing the display involve the use of ANSI escape sequences.

**WRITING CHARACTERS** Once you have used an {Open CON,W} command to access the screen of your computer, writing text to it is as simple as using that text as the argument of a {Write} or {WriteLn} command. For example, the command {Write "This is a test"} writes the phrase "This is a test" to the screen.

When 1-2-3 writes information to the screen, it does so at the cursor's current position. Initially, the cursor is located at the upper-left corner of the screen. As you write text to the screen, the cursor moves to the space following that text. Text that will not fit on the current line of the screen will wrap to the beginning of the next line.

It is important to note that the characters you write to the screen with the {Write} and {WriteLn} commands are not entered into the worksheet itself. Instead, they are displayed on top of that sheet. Consequently, they do not affect the worksheet in any way other than to temporarily obscure some of the spreadsheet information. The characters will remain visible until 1-2-3 redraws the area of the screen that they overlay.

**MOVING THE CURSOR** You can also use {Write} and {WriteLn} to send special character sequences that move the cursor around the screen. These sequences are shown in Figure 1. To move the cursor,

simply use the appropriate escape sequence as the argument of a {Write} or {WriteLn} command. For example, the command

```
{Write @CHAR(27)&"[5C"}
```

which sends Escape, [, 5, and C, moves the cursor five spaces to the right.

The work area of your screen is 25 rows deep by 80 columns wide. Your computer starts counting with 1 for purposes of identifying rows and columns of the screen. Consequently, row 1, column 1 is the upper-left corner of the screen; row 25, column 80 is the lower-right corner.

**STYLES AND COLORS** You can also use escape sequences to assign special display attributes and colors to the text you write to the screen. The sequences to invoke various display styles (inverse video, blinking, intense, and so forth), and the possible background and foreground colors are also shown in Figure 1.

When you write a character to the screen of your computer, that character will appear in whatever combination of styles and colors is active at the time. Consequently, when you want a character to appear in a certain style and color, you must clear the attributes that you don't want and invoke the ones that you do want before you send that character to the screen. Style attributes are cumulative; color attributes are not.

**ERASING CHARACTERS** Other ANSI escape sequences allow you to selectively erase portions of the text on the screen (see

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## ■ SPREADSHEET CLINIC

### ANSI Escape Sequences

#### Cursor Movement

Keystroke	Effect
EscA	Moves cursor one line up
EscB	Moves cursor one line down
EscC	Moves cursor one character to the right
EscD	Moves cursor one character to the left
Esc#A	Moves cursor # lines up
Esc#B	Moves cursor # lines down
Esc#C	Moves cursor # characters to the right
Esc#D	Moves cursor # characters to the left
Escx,yh	Moves cursor to row x, column y
Escs	Saves current position of the cursor
Escu	Moves cursor to the saved position

#### Display Styles

Keystroke	Effect
EscOm	Disables all style attributes
EscIm	Enables bold attribute
Esc4m	Enables underline attribute
Esc5m	Enables blinking attribute
Esc7m	Enables inverse attribute

#### Screen Colors

Keystroke	Effect
Esc30m	Sets black foreground
Esc31m	Sets red foreground
Esc32m	Sets green foreground
Esc33m	Sets yellow foreground
Esc34m	Sets blue foreground
Esc35m	Sets magenta foreground
Esc36m	Sets cyan foreground
Esc37m	Sets white foreground
Esc40m	Sets black background
Esc41m	Sets red background
Esc42m	Sets green background
Esc43m	Sets yellow background
Esc44m	Sets blue background
Esc45m	Sets magenta background
Esc46m	Sets cyan background
Esc47m	Sets white background

#### Character Deletion

Keystroke	Effect
EscK	Erases from cursor to end of line
Esc1K	Erases from beginning of line to cursor
Esc2K	Erases entire line
EscJ	Erases from cursor to end of screen
Esc1J	Erases from beginning of screen to cursor
Esc2J	Erases entire screen

Note: The Esc character is 1Bh or 27 decimal.

**Figure 1:** Use these escape sequences in conjunction with 1-2-3's file I/O commands to move the cursor, assign special display attributes and colors, and erase information from the screen.

Figure 1). For example, the escape sequence escape[2K erases the current line. To send this sequence of characters, you would use the command

```
{Write @CHAR(27)&"[2K"}
```

**THE IMPORTANCE OF ANSISYS** In order for your computer to be able to understand these escape sequences, it must read the file ANSI.SYS when it boots. (ANSI.SYS can be found on any original DOS disk.) In order for this to happen, ANSI.SYS must be in the root directory of the disk from which you boot your computer, and the CONFIG.SYS file on this disk must contain the statement DEVICE=ANSI.SYS. If the root directory of your boot disk does not contain a CONFIG.SYS file, you should create it by typing the command

```
copy con config.sys
```

If the root directory does contain a CONFIG.SYS file, you may use EDLIN or almost any text processor to add the required statement to it.

**CHARACTER TRANSLATION 1-2-3** passes every character exported by a {Write} or {WriteLn} command through the file translation table contained within the .SET file that you used to load 1-2-3. As you have already seen, the codes that allow you to position the cursor on the screen, assign special display attributes, and erase characters from the screen all begin with ASCII character 27—the escape character. Unfortunately, 1-2-3's default character translation table does not allow it to export the escape character; instead, it translates that character into ASCII character 32.

A 288-byte segment within any 1-2-3 driver set (.SET) file controls the translation of incoming and outgoing characters. The first 32 bytes in this segment control the translation of outgoing characters 0 through 31. (The 28th byte controls the translation of the escape character.) The next 128 bytes control the translation of outgoing characters 128-255; the final 128 bytes control the translation of incoming characters 128-255. 1-2-3 does not translate incoming characters 0-31, or characters 32-127, whether they are incoming or outgoing.

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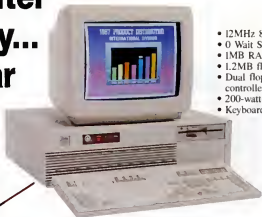
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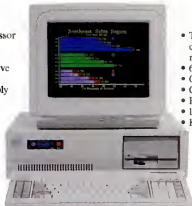
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CIRCLE #94 ON READER SERVICE CARD

## PRODUCTIVITY

### ■ SPREADSHEET CLINIC

**USING DEBUG.EXE** DEBUG.EXE provides the easiest way to modify your .SET file so that character 27 is not translated when it is exported. Before you begin, you should use DOS's COPY command to make a copy of the .SET file you want to modify. That way, you'll have an unaltered copy of the .SET file in case you make a mistake during the process of altering the file. Let's assume that you've given the name TEMP.SET to the copied file.

Once you've made a copy of the .SET file that you want to modify, make the directory that contains your DOS utility files (including DEBUG.EXE) current. Then, begin the debugging process by typing DEBUG, followed by the path and name of the file you want to alter. For example, if you want to alter the file named TEMP.SET, which is located in the C:\123201 directory, you would type

```
debug c:\123201\temp.set
```

If the file you specified exists, DEBUG will move the cursor to the next line and display a hyphen. If DEBUG is not able to locate the file you specified, it will display the message "File not found," then present a hyphen. If that happens, type q and press Enter to exit from DEBUG, then try again. Next, you should instruct DEBUG to search within the open .SET file for the ASCII sequence 159, 173, 155, 156, and 63. These are bytes 64 through 68 in the 288-character translation table, but the first set of unique characters within it. To find these characters, at the hyphen type

```
scs:0000 ffff 9f ad 9b 9c 3f
```

then press Enter (9f, ad, 9b, 9c, and 3f are the hexadecimal representations of ASCII characters 159, 173, 155, 156, and 63, respectively).

As soon as you press Enter, DEBUG will display a nine-character address on the next line, then a hyphen on the following line. For example, DEBUG might display the characters 106E:568E. This address is the location of the 64th byte of the translation table within the .SET file. To determine the address of the 28th byte in that table (the one that controls the translation of an exported escape character), at the hyphen type

```
h address 25
```

where *address* is the last four characters in the address of the 64th byte, and 25 is the hexadecimal representation of ASCII character 37. For example, if the scs command returned the address 106E:568E, you would type

```
h 568e 25
```

As soon as you press Enter, DEBUG will present two addresses, one after the other. For example, if you typed

```
h 568e 25
```

DEBUG would return the addresses 56B3 and 5669. The second address (in this case, 5669) is the address of the 28th byte in the translation table—the 37th byte prior to the 64th byte in the translation table. This is the byte that controls the translation of the outgoing escape character.

To replace this character with ASCII character 27 (the escape character), you must use the command

```
e location 1b
```

where *location* is the address of the 28th character in the table, and 1b is the hexadecimal representation of ASCII character 27. For example, if the previous h command returned the addresses 56B3 and 5669, you would type

```
e 5669 1b
```

As soon as you press Enter, DEBUG will present another hyphen. At this point, you should command DEBUG to write the change to disk. To do this, type w at the hyphen and press Enter again. Then, type q and press Enter to exit from DEBUG.

### USING THE ALTERED DRIVER SET

Once you have modified a driver set, you should command I-2-3 to use it by typing the name of that file to the right of the characters 123 when you load I-2-3. For example, if you modified .SET file was named TEMP.SET, you would load I-2-3 by typing

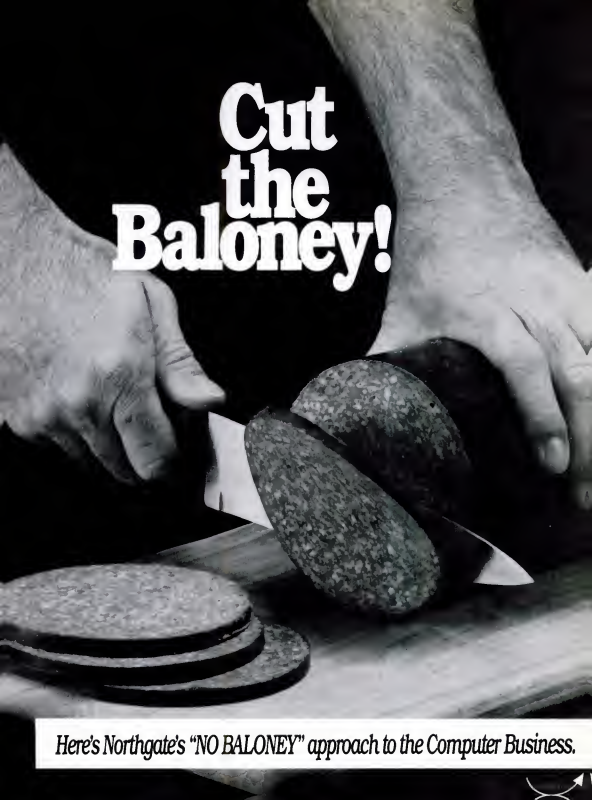
```
123 temp
```

at the DOS prompt for the directory that contains your I-2-3 program files.

### APPLYING THIS TECHNIQUE

Once you have booted your computer with a CONFIG.SYS file that specifies AN-

# Cut the Baloney!



*Here's Northgate's "NO BALONEY" approach to the Computer Business.*



When every ad  
looks alike, sounds  
alike and makes  
the same claims,  
IT'S TIME TO...



## YOU'LL GET NO BALONEY FROM NORTHGATE!

We like a good slice of sausage as well as the next guy. But baloney doesn't belong in the computer business.

Whether you're planning to spend your company's money or your own, you deserve solid information, not half truths and contradictions.

That's why Northgate is dedicating this portion of our ads to pointing out where others may fall short in giving you facts to base your buying decision. So for openers...

## ALL NEW FROM NORTHGATE...THE 386 SUPER MICROCOMPUTER

# Crackling 20MHz Performance in a Complete System with 28 Millisecond 65MB Hard Drive, Power Case and Monitor at the price others charge for 16MHz!

**\$3899.00**

DESKTOP MODEL  
JUST \$3,699.00

**COFFCAT** technology just doesn't meet Northgate's standard. So our engineers developed a spanking new 386 system that by-passes 16MHz completely and goes straight up to 20MHz processing speed.

Performance and features like no other. And priced where you'd expect to buy an ordinary 16MHz system.

The new Northgate 386/20SM is a speed-burner. With a zero wait state page mode memory management method produces performance as fast as any in standard DOS programs.

And, when using higher memory applications such as in networking Windows 386 or Xenix, the 386/20SM leaves others in its wake.

Truly the new price/performance leader in the industry!

### 32-BIT ARCHITECTURE THROUGHOUT...

This new Northgate system uses one or four megabytes of high speed 32-bit memory on the motherboard. When you need additional RAM, two 32-bit slots each hold 8MB memory cards. That's right—20MB RAM capacity.

And of course the motherboard has 387

and Wettek sockets.

Fully enhanced, Northgate's 386/20SM exceeds the speed of many mainframe systems.

### SELECT "386 NORTHGATE POWER" OR DESKTOP CASE...

Widely applauded as the Rolls Royce of floor standing cases, the Northgate cabinet is a line piece of engineering. It has space for three exposed half-height devices and two internal half-heights or one full-height.

Not a re-hashed desktop with sheet metal welded to the bottom, but a true free-standing extra-heavy-duty steel case.

It has a big heart, too. A 250-watt switching power supply is now standard. Add any peripheral you want, 386/20SM can handle it with ease.

Front-mounted controls for high/low speed, system reset and keyboard lockout.

Our desktop model has the same drive capability as the Power case, features quality construction, front controls and \$200.00 lower price.

**Feature for feature, Northgate's 386/20SM is unquestionably your best buy.**

### CUT THE PERFORMANCE BALONEY:

A common practice is to run processors out of spec. 16MHz 386's pumped up to 20MHz. New 20MHz 286's with only 16MHz processors. The chip maker doesn't sanction it. But that doesn't stop the Baloney Merchants.

AND, if you think you can buy a cheap 25MHz 386 system, think again. Odds are you'll get a 20MHz processor. The 25 MHz Intel chip alone carries a huge price. Besides being scarce.

Don't buy a system running out of spec! Unless you want to risk parity errors and unexpected network, software and other incompatibility problems.

Your Northgate computer performs as we advertise. No tricks. No gimmicks. If we say the Northgate is a 20MHz, that's the processor you get. Performance and compatibility, of course, are guaranteed by Northgate.

### CUT THE BUS BALONEY:

If you're waiting for some new "miracle" bus design before you buy—go get an abacus. The current bus will be the standard for a long time. And when one comes along that makes sense, Northgate will have it.

### CUT THE HARD DRIVE BALONEY:

Northgate popularized 1:1 interleaving and RLL, encoded hard drives for peak system throughput performance. Now it's common to see 1:1 performance claims on the low, low cost systems.

So you buy one and find the mother-board accepts the 1:1 instruction only sometimes. Overall performance is just minimally increased if at all.

Only Northgate explains how throughput depends on using drive format factors other than MFH. Buy an MFH drive with 1:1 interleaving and you're wasting money BUYING BALONEY.

### CUT THE BENCHMARK BALONEY:

First, the much-publicized "Speedbar." Forget it! For high performance system benchmarking, it's worthless. Too easy to trick. The results it shows are meaningless.

Then good old Norton SI. There are many Norton versions. BUT only 4.0 gives useful relative performance measures on high speed computers. When you see Norton SI in ads, ask which version.

Northgate uses two benchmarks we believe in. PC Labs' Bench Test is superb. And for in-depth testing, we use Power Meter. When you're



**NORTHGATE 80386SM AND 80286 Model**

**800,000 BYTES PER SECOND SYSTEM THROUGHPUT...** Northgate system throughput is second to none. We understand how to design, engineer and produce the same speed as silicon throughput. Using specially manufactured and modified components—controllers, bus, software etc.—Northgate gives you maximum performance—800,000 bytes per second or more.

Few others can handle copy 300,000 BPS data transfer rate out of their systems. So why put out good money for ordinary performance when you can get Northgate's estimated performance for the same or less dollars?

### VGA VIDEO TWICE AS FAST AS MOST OTHERS...

Again, our limited performance from Northgate. Just as we don't even bother with 16MHz 386, we give you right pixel VGA straight to 16-bit VGA as

standard, not 8-bit as most others offer. It's more than twice as fast as standard monochrome. For comparison, Dell's new System 220 A-K is advertised as the same speed as monochrome.

You get a wider VGA video selection with Northgate. Either VGA Graphics, Analog or Multi-graphics models available. VGA Graphics costs only \$250.00 to mono-graphics costs. And all monitors are in resolution 14 inch—not 16-inch—12".

Of course we still offer mono-graphics featuring 14 inch flat-screen with 1000 line resolution capability in either amber or the increasingly popular, paper white screen.

**NOW, THE SYSTEMS WITH SCSI CAPABILITY...** SCSI (Small Computer System Interface) is the technology of the future and now

## Compare Features...Compare Pricing...Then Call Northgate

**NORTHGATE 386/20SM** includes: 1MB RAM, 20MHz Intel Processor, Power Case (for desktop case deduct \$200.00), One 1.2 MB floppy, One 1.44 MB floppy, 65MB RLL, 28MB Hard Drive, with 1:1 Interleave, 16 bit Controller, 14 inch High Resolution Platinum Amber or Paper White Monitor, OmniKey/102, VOPT Disk Optimizer, Disk Cache Software.

**PRICE FOR ABOVE SYSTEM \$3,699.00**

**NORTHGATE 386/30SM** includes: 1MB RAM, 20MHz Harris Processor, Desktop Case, One 1.2MB floppy, One 1.44MB floppy, memory on the motherboard, When you need additional RAM, two 32-bit slots each hold 8MB memory cards. That's right—20MB RAM capacity. And of course the motherboard has 387 and Wettek sockets.

**PRICE FOR ABOVE SYSTEM \$3,599.00**

**NORTHGATE 386/16**—Basic specifications as 386/20 but with Harris 16MHz Processor.

**PRICE FOR ABOVE SYSTEM \$2,399.00**

**NORTHGATE 386/16 (XT KILLER)** includes: 640K RAM One 1.2MB floppy Drive, 65MB RLL Hard Drive, 14 inch 16 bit Controller, 14 inch High Resolution Platinum Amber or Paper White Monitor, OmniKey/102, VOPT Disk Cache Software.

**PRICE FOR ABOVE SYSTEM \$1,799.00**

## Northgate Options Prices

	VGA GRAPHICS	16-BIT VGA ANALOG	16-BIT VGA SCSI	ESX 16MB	ESX 32MB
VIDEO OPTIONS ADD	\$250.00	\$350.00	\$650.00		
ESX 65MB	\$110.00	\$200.00	\$300.00	\$1,200.00	
ESX 128MB					

MS-DOS 4.0 with CMTASC \$95.00 MS-DOS 3.3 with CMTASC \$75.00  
Other options include: Removable 5 1/4" Disk, Hard Drive 20MB, VGA and Disk Opt. Professional AD Modem in 37 inch, New 802.11b Ethernet Network Systems and Software.

computer shopping, ask for results of these tests. At least they're consistent and hard to "biddle."

You'll find no benchmark baloney in Northgate advertising.

#### CUT THE VGA BALONEY!

If the ads don't say 16-bit VGA, you're getting only 8-bit performance. 16-bit VGA costs lots more. So a cheap price on a VGA system means you're not getting full value for your money. It's like XT vs. AT performance. 8-bit is half as fast as a true 16-bit board. Many low-end VGA boards are incompatible with some software. Northgate gives you a VGA compatibility guarantee.

Northgate's 16-bit VGA is well over twice as fast as 8-bit VGA. Re-check the apes on that ad for the cheapo VGA system.

#### CUT THE KEYBOARD BALONEY!

Only Northgate provides OmniKey, the keyboard experts agree is the finest ever created. Others boast "clicky" keyboards but none have the intelligent, high production layout of OmniKey.

Ask what their keyboard weighs. Isn't it all plastic? Warranty? Northgate thinks enough of its customers to bring you OmniKey to

complement an equally uncomplaining computer system!

#### CUT THE PHONE SALES BALONEY!

At Northgate, we can't "sell" you a thing. We can only help you get what you want. That's us. Talk to one of our account managers. Discover how much our people know about computers and can truthfully help you get what you want and need. No over-selling baloney here!

We can even give you names of Northgate owners in your immediate area so you can find out for yourself why our customers are so enthusiastic.

Then call the other guys and you ask the same kind of tough questions you ask us.

#### CUT THE TECH SUPPORT BALONEY!

Tech Support is integral to the computer business. Whether it's a failed part, a user unfamiliar with configuring a peripheral, software installation.

When you're shopping, check our Tech Support Department. Discover how knowledgeable and helpful they are. Ask about the unique way service is handled at Northgate.

Northgate was first to guarantee shipment of user replaceable parts—

OVERNIGHT AT OUR EXPENSE—without first receiving the failed part. Result: Downtime is reduced to one day.

Many others require you to return the part first. Then you face days or weeks of not being able to use your computer. Many companies won't send parts to you at all. You must ship back the whole machine. Costly, inconvenient, time wasting.

Just as important is the warranty period. Look closely at the ads. You'll see the line "manufacturer's warranty applies" in many. That means if the manufacturer put a one-year warranty on the part, but it sat around a distributor's for a few months before being sold to your source, guess how much life is left on the warranty.

Northgate warranties all parts for one full year. Should the system need to be returned, service is free, and we warranty every part of the system, disk drives, hard drive, monitors, etc.

#### CUT THE LOWBALL PRICING BALONEY!

Northgate prices its products as complete systems. We do it that way to assure you the best possible value for your computer investment.

From experience we know the components we include are those

you'll end up buying sooner or later. By including them in a Northgate system, we can save you the money, the work and the confusion of adding a part later.

Many in our business advertise prices for only partial systems to look more competitive. Less RAM than you know you need. A hard drive so tiny it's laughable. An out-of-date monitor.

And while the price for the system may catch your eye, just try upgrading. Like the car business, that's where they get you. One highly-touted company has the nerve to charge \$10,000 per meg of RAM (true costs are only about \$500). Such an "up charge" is part of the Baloney.

#### YES, BALONEY ABOUNDS.

And we can't cover all of it in this ad. Northgate plans to include a continuing "No Baloney" section in all future ads. We'll up-date the current sect as we see it.

Maybe you agree with us. Maybe not. But if you find what you think is "baloney" in anything we publish, we'd like to hear from you. Write our Baloney Control manager, Sonja Held.

*All we're saying is "get straight facts before you buy." If you don't agree that's a good advice, go ahead and buy the Baloney.*



**all offer the following advanced features:**

gate offers it today! Our SCSI model has an SCSI host adapter. Connect as many as 7 intelligent devices—hard drives, tape backup that can spin in background, optical laser drives, etc.

Now SCSI technology no longer costs a fortune. Check our prices for SCSI with 40MB hard drive. Performance tips with these drives—under 18 Millisecond access speeds. Ideal for intensive data base applications, or loading your spreadsheet in a blink.

Check the prices below and phone for more details on how Northgate's SCSI technology will put more zip in your system performance at a price that more than pays for itself.

**ESDI HIGH SPEED DRIVES TO 750 MEGABYTES.** Northgate brings price reality to high capacity hard drive systems. While others

charge outlandish prices, Northgate's down-to-earth pricing puts these memory monsters well within your budget. Cost per megabyte is nearly halved when you order this team.

**OMNIKEY102 IS A NO-COST OPTION.** You'll delight in using OmniKey102. Every magazine review and thousands of users agree. OmniKey is the standard against which all other keyboards can be judged. And it comes with all Northgate systems as a no-cost option. (Oh yes, if you don't buy a Northgate system and still want the best keyboard in the world, you can buy OmniKey separately for \$99.00. See our ad.)

**Add it all together. Compare with the other guys. Then call Northgate and feel confident you're buying the best!**

**ALL NEW FROM NORTHGATE...THE 286 SUPER MICROCOMPUTER LINE**

## A Superb Family of 286 Systems... From the 20MHz, fastest in the industry; The 16MHz, for speed at a savings; To our XT-Killer 12MHz...

**TRUE 20MHz \$2599<sup>00</sup>**  
complete system

COMPLETE WITH 65MB HARD DRIVE, 2 FLOPPIES,  
AMBER OR WHITE 14" MONITOR AND OMNIKEY102

**NORTHGATE** takes 286 technology to its peak with our 20MHz model. Featuring a genuine 80C286 Harris 20MHz processor for maximum reliability. Our 286/20SM is a true Super Microcomputer. Designed by Northgate, for Northgate exclusively.

You can order it with our spectacular 16-bit VGA graphics. With your choice of RLL, ESDI and SCSI (yes, it runs under SCSI) hard drive systems. And, Northgate's exclusive OmniKey102 is yours at no extra cost—still another Northgate Quality Feature.

Realistically priced, and featuring a broad selection of drives and video displays, 286/20SM has a new Northgate feature no other system in the industry can offer...

#### INTRODUCING..."LIGHTNING ALLEY"

All Northgate 286 systems are designed with a slot for extended memory we call "Lightning Alley." And it's a part of our exclusive design for our 286 systems. Simply stated, "Lightning Alley" lets you add a RAM card that runs at processor speed, not bus speed. No other system we know of does this. They all run at bus speed, 8 or 10MHz.

"Lightning Alley" boosts extended memory functions up to twice the performance—or more—of any other system. So if you're using extended memory in your system as a file server, for Xenix, AutoCAD, OS/2, Windows, you'll see your programs

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CIRCLE 532 ON READER SERVICE CARD

## ■ SPREADSHEET CLINIC

	A	B	C	D	E	F	G	H
1	\c	{PanelOff}						
2		{Open CON,W}						
3		{Write @CHAR(27)&"[1;"&@STRING(88-@LENGTH(MESSAGE)+1,0)&"N"}						
4		{Write @CHAR(27)&"[8m"}						
5		{Write @CHAR(27)&"[5;34;43m"}						
6		{Write MESSAGE}						
7		{Calc}						
8		{Write @CHAR(27)&"[8m"}						
9		{PanelOn}						
10								
11	MESSAGE	CALCULATING						
12								

Figure 2: The blinking message "CALCULATING" in blue letters on a yellow background in the upper-left corner of the screen is displayed while 1-2-3 recalculates the current worksheet.

SI.SYS as a device and loaded 1-2-3 with a driver set that does not translate an outgoing character 27, you can run macros that use ANSI escape sequences to control the attributes and location of the text that is written to the screen.

The macro shown in Figure 2 uses the techniques discussed above to create a custom mode indicator. Although the {Indicate} command gives you access to this portion of the screen, it limits you to a meager five characters and does not give you any control over the colors or other attributes of the message. Figure 2's macro overwrites the Mode indicator with the blinking, 11-character message "CALCULATING" displayed in blue letters on a yellow background, while 1-2-3 recalculates the worksheet.

The first statement in this macro, {PanelOff}, freezes the control panel. This prevents 1-2-3 from writing information to this portion of the screen during the execution of the macro but does not inhibit the display of messages produced with file I/O commands.

Next, {Open CON,W} opens the console (screen) in the Write mode. The third statement positions the cursor on the first line of the screen, as many spaces to the left of the right edge of the screen as there are characters in the custom message stored in the cell named MESSAGE (cell B11). In this case, MESSAGE contains the 11-character label CALCULATING, so 1-2-3 places the cursor on the 70th character on that line. This positioning assures that the custom message will stretch all the way to the end of the line, completely obscuring 1-2-3's default Mode indicator.

After 1-2-3 has opened the screen and positioned the cursor, it will execute the fourth statement, clearing all current dis-

play attributes. Next, the macro executes the statement in cell B5, which will switch on the blinking blue foreground and yellow background attributes will be active when 1-2-3 writes this message, it will have those attributes.

After 1-2-3 sets these attributes, it will evaluate the next statement (cell B6), which writes the label stored in the cell named MESSAGE (cell B11) to the screen at the current position of the cursor. Since the blinking blue foreground and yellow background attributes will be active when 1-2-3 writes this message, it will have those attributes.

The {Calc} statement commands 1-2-3 to recalculate the worksheet—the true purpose of this macro. Normally, in addition to recalculating the worksheet, this command would place the blinking message "WAIT" in black letters on a red background in the Mode indicator. The {PanelOff} command at the beginning of this macro prevents this message from partially overwriting the custom message.

After 1-2-3 has recalculated the worksheet, it executes the statement in cell B8. This statement clears all the attributes, so that your screen will appear normal when you return to DOS. The final command in the macro, {PanelOn}, refreshes the control panel area of the screen, erasing the custom message.

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# USER-TO-USER

*Tips on how to gain more hard disk space, extend your computer's life, print blank lines in batch files, rescue a hard disk drive, and format disks faster.*

## Here's a program that prints a blank line in your batch files and works with all versions of DOS

One of the most irritating problems I have with using batch files in DOS is their inability to ECHO a blank line easily. The available solutions are limited to a certain version or brand of DOS. This is inadequate for my needs, because my clients have several different versions and brands of DOS. What I have come up with is a small program (12 bytes) that will advance the cursor one line simply by printing a CR/LF on the screen. Because it is an actual program and not a patch, it will not interfere with anything and can be used at any time.—Paul Russell; Halifax, Nova Scotia, Canada

CR/LF is computer shorthand for "carriage return/line feed," terms describing the operation of a typewriter. A carriage return makes the output device return to the start of the line, and a line feed makes it advance to the next line. Writing a CR/LF pair to the screen produces a blank line, which is exactly what was wanted.

To create DO\_CRLF.COM, copy the text from Figure 1 using any word processor or editor that can create a DOS text file with no control codes. Be sure to include the blank line after the "INT 20" line and after the final "Q". Save the file as DO\_CRLF.SCR. Now pass this file as input to DEBUG:

```
DEBUG < DO_CRLF.SCR
```

```
N DO_CRLF.COM
A100
MOV     DX,0109
MOV     AH,09
INT     21
INT     20

E109 0A,0D,24
RDX
C
W
Q
```

Figure 1: The DEBUG script to create DO\_CRLF.COM.

If you see "Error anywhere in the display, do not attempt to run the resulting program. Instead, double-check your script to see what you did wrong and correct it; then run it through DEBUG again.

## Ten easy steps to gain more hard disk space

No matter how much hard disk space I have, I find it's never enough. Here are some techniques I use to maximize the free space.

■ **Optimize cluster usage.** The minimum storage unit on a floppy or hard disk is known as a cluster. A cluster holds 2K on a 20MB hard disk that has been formatted with DOS 3.x. That means that even a 1-byte file will occupy 2,048 bytes of space. A file 2,049 bytes long will hog 2 complete clusters, or 4,096 bytes. If you could shrink that file by 1 byte, you would save

2K of your valuable disk space.

I routinely scan the lengths of .DOC and .TXT files to see if any are candidates for shrinking. I manually shrink those with lengths just over the 2K boundaries by editing out white spaces or useless data. You'd be surprised how much data can be stripped from large text files without losing any real information.

■ **Merge small documents.** If you have a directory with many small .DOC files, you could save space by merging them into one big file. The smaller the original files and the more of them there are, the larger your savings.

■ **Remove duplicates.** The Programming/Utilities column in the June 9, 1987, issue carried a very useful utility called REPEATS. Basically, it locates duplicate filenames on your hard disk. In one case, I ran REPEATS on a hard disk and found over ten copies of AUTOEXEC.BAT, COMMAND.COM, and CONFIG.SYS. The savings are obvious.

■ **Reduce your cluster size.** Rather than explain this process, I refer you to PC Magazine, March 31, 1987, page 335. This is probably the most powerful means of gaining space. You are a candidate for reduction if you have a hard disk larger than 10MB, formatted with DOS 2.x.

■ **Combine batch files.** If you have two or more batch files that do similar jobs, combine them into one. Use replaceable parameters to select which to do.

■ **Delete backup files.** Depending on what application programs you use, there are probably many .BAK, .BK1, or similar files on your hard disk. Make it a point to



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## PRODUCTIVITY

### ■ USER-TO-USER

habitually sweep through the subdirectories to delete them. *PC Magazine's* SWEEP.COM (November 12, 1985) will allow you to sweep the command DEL \*.BAK across all your directories. Warning: it's all too easy to type DEL \*.BAT instead of DEL \*.BAK.

■ **Eliminate lazy subdirectories.** Just making a subdirectory eats away one cluster from the hard disk. If that subdirectory is used to store just one or two files, then you're not using it efficiently. Move those files elsewhere and delete the directory.

■ **Use keyboard macros.** Some batch files are very small. Change them from batch files to keyboard macros and save at least 2K each.

■ **Clean up hidden system files.** If you've used utilities like XTREE to copy entire floppy disks onto your hard disk, you may be copying the hidden system files as well. Since these are necessary only for booting, they are redundant on the hard disk. So search your hard disk for hidden files and delete the unnecessary ones.

■ **Run CHKDSK.** CHKDSK may report unallocated clusters. These clusters are flagged as being used, but in fact don't belong to any file. Delete them, and reclaim your disk space.—Joe Cygman; Montreal, Quebec, Canada

To paraphrase Parkinson's Law, hard disk contents expand to fill the space allotted. No matter how big a disk, eventually it will fill up.

Often a few large files account for a large proportion of disk space. On my system, 25 percent of the disk space is in under 2 percent of the files. One way to save space is to look over these very large files and eliminate any that are dispensable. You'll want a list of all files on your disk, sorted in descending order of size. The following command using SWEEP.COM (*PC Magazine*, November 12, 1985) produces such a list:

```
SWEEP DIR *.* | FIND /V "<DIR>" | FIND  
"-" | SORT /R /+14 >C:\SIZES
```

The command above assumes that C: is your hard disk, and that SWEEP, FIND, and SORT are all available on your path.

Be prepared to wait—this process can take quite a few minutes. When it's finished, the file called SIZES will contain a

list of files on your hard disk, with the biggest first. Consider carefully: Can you get rid of any of these?

### Extend the life of your computer by keeping it cool

Heat affects system performance and life, and there are quite a few things you can do to cool down a hot system. Here are some tips from Doug Dodson, President of PC Power and Cooling Systems:

■ If you have any empty slots, keep the slot covers on them. Otherwise the proper airflow is disturbed.

■ Be sure the ribbon connectors for your disk drives don't block the flow of air.

■ If you put a desktop PC vertically on the floor, don't let the carpet or anything else block the vents.

■ Don't let the sun shine on your computer, and don't operate it in a hot room.

■ Put heat generating add-in cards (for example, accelerator cards and network cards) closest to the power supply, and put heat sensitive cards (for example, hard disk cards) farthest away.

■ Alternate full and empty slots.

■ Some old PCs and XT's have vent holes in the front of the drive base. IBM recommends that you cover these holes so that the main airflow is through the vent slots on the left, across the cards, and out the fan on the back right.

■ Upgrade to a stronger fan or power-supply.

Many PC components are specified to run at temperatures below 120 degrees Fahrenheit only. Below 100 degrees is even better. Keeping your PC cool could extend its lifespan significantly.

### Conceal COMMAND.COM as a hidden file, so that only DOS can find it

I have an unusual fear of someone messing up my system, if only by mistake. Therefore, I have put my COMMAND.COM, as well as other powerful programs (FORMAT.COM, XDEL.COM, and others) in a hidden directory as hidden files. I must thank you for the file ATTR.COM (PC



Magazine, June 10, 1986). With it I was able to render dangerous files invisible to most persons. Those with enough expertise to find them are not likely to use them injudiciously.

The CONFIG.SYS and AUTOEXEC.BAT had to remain on the root of the boot drive for normal booting. But I don't want any virus to look in my root directory and attack my COMMAND.COM. Therefore, I SYSED a floppy disk to boot from and put AUTOEXEC.BAT and CONFIG.SYS on it. I used the command

```
SHELL = C:\HIDDEN\COMMAND.COM /P
```

in my CONFIG.SYS to create a shell that uses the hidden COMMAND.COM; and in my AUTOEXEC.BAT I use

```
SET COMSPEC=C:\HIDDEN\COMMAND.COM
```

The SHELL command in CONFIG.SYS and COMSPEC= in AUTOEXEC.BAT let me put COMMAND.COM elsewhere.

With AUTOEXEC and CONFIG hidden away on my boot disk, DOS can find my COMMAND.COM, but nobody else can.

Now I am ready to cook, and nobody can find that hidden directory by chance. It would even be difficult for an expert, as the two files CONFIG.SYS and AUTOEXEC.BAT are hidden on both disks and I don't leave any programs around that will display hidden files except in the hidden directory that only I know exists.—Tom Bell, Holly Hill, Florida

There's one catch in this system. What if you use batch files that call on COMMAND for nesting? Clearly you don't

```
ECHO OFF
SET COMSPEC=C:\HIDDEN\COMMAND.COM
C:
AUTOEXEC
```

Figure 2: A floppy-disk AUTOEXEC.BAT file for use with a hidden COMMAND.COM.

want to put the hidden directory on the PATH, nor do you want to spell out its name in your batch file. What are you going to do?

The solution is simple: use %COMSPEC% anywhere in a batch file where you would have used COMMAND.COM. When the batch file runs, the %COMSPEC% variable gets replaced by its value, which in this case is C:\HIDDEN\COMMAND.COM. Be sure to have ECHO OFF, or someone may see your COMMAND path.

Naturally you'll set up the AUTOEXEC.BAT on the floppy disk so it transfers control to the AUTOEXEC.BAT on the hard disk—just after setting the COMSPEC, as shown in Figure 2. You'll probably also want to have a "decoy" CONFIG.SYS on the hard disk. Do note that the COMSPEC environment variable will always point to your COMMAND.COM, so there's no way to hide it completely.

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## ■ USER-TO-USER

**DOS 3.3's FDISK rescues a hard disk drive**

I recently installed a 43MB hard disk in an IBM PC-XT. The hard disk came from an old minicomputer that was to be scrapped. For the cost of a disk controller I was able to upgrade an XT with a badly needed hard disk.

The low-level format ran without problems. I used FDISK to set a primary partition of 32MB and an extended partition for the remainder. Everything looked great until the FORMAT command bombed. After a couple of attempts, I realized that FORMAT would always fail at the same place on the hard disk, which rendered 15MB unusable. My first thought was to use FDISK to partition around the affected area. FDISK let me set the primary partition up to the offending cylinder, but insisted on using the bad cylinder as the start-

ing value for the extended partition. After a couple of cups of coffee and a little head scratching, I found the solution.

I set the primary partition to cover all of the disk area up to the affected area, as before. But this time, I created a small extended partition to cover the bad cylinder. Then I set up an additional extended partition using the remainder of the disk. FDISK labeled the three partitions as C, D, and E. Next, I used FDISK to delete the D partition (the problem area). It changed the last partition from E to D, thus effectively blocking out the offending area. The hard disk has been humming along ever since.

—Jack E. McCoy; Deep Run, North Carolina

DOS can map out a partition's bad sectors in the file allocation table (FAT). However, if a bad sector is located right in the FAT or in the partition's root directory, FORMAT can't handle it. This solution is

clever: it creates a partition that involves only the bad sectors and then removes all access to that partition.

**Productivity Tip**

You can't put spaces in filenames, but you can use ASCII character 255, which looks like a space. Create it by pressing Alt, typing 255 on the numeric keypad, and then releasing the Alt key. To create a "secret" directory, give it a name that consists of one or more ASCII 255 characters.

**Format disks faster using this undocumented PC-DOS 3.3 FORMAT switch**

The FORMAT command in PC-DOS 3.3 has an undocumented switch that makes formatting disks faster. The /H switch

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makes **FORMAT** skip the "Insert disk and press any key" message:

```
FORMAT A: /H
```

This immediately causes the diskette in drive A: to be formatted. After formatting, DOS will ask if you want to format another. Insert another disk, type Y, hit Enter, and **FORMAT** will immediately format that disk.

I discovered this undocumented switch when using the **BACKUP** command's /F switch. If **BACKUP** encounters an unreadable disk and you specified the /F switch, it will start formatting the disk immediately. I knew **BACKUP** was **EX-ECuting FORMAT**, so there had to be a switch on the **FORMAT** command that caused an immediate format. Dumping **BACKUP.COM** led me to the /H switch.

I don't know if this works under **MS-DOS** or any other OEM versions of **DOS**, but it's worth a try—especially when

```
ECHO OFF
:LOOP
ECHO N | FORMAT A: /H
IF ERRORLEVEL 1 GOTO NoMore
ECHO PUT a new disk in drive A: now.
ECHO N | FORMAT B: /H
IF ERRORLEVEL 1 GOTO NoMore
ECHO PUT a new disk in drive B: now.
GOTO LOOP
:NoMore
ECHO DONE FORMATTING
```

**Figure 3:** This **DOS 3.3** batch file alternates formatting disks in drives A: and B:.

you're formatting a whole slew of disks.  
—Dan Gookin; San Diego, California

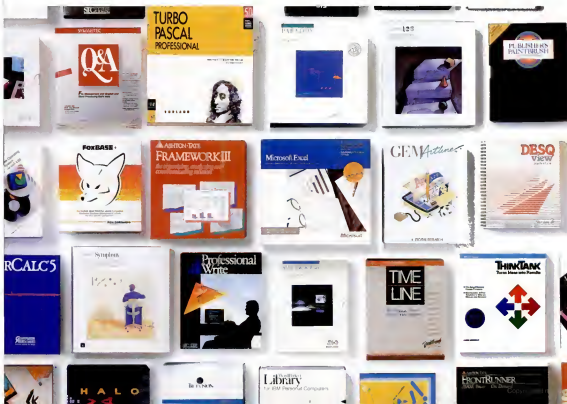
The /H switch doesn't exist in **PC-DOS** before Version 3.3. If you're using an **MS-DOS** version, the easiest way to find out if it has the /H switch is to try it. If it's not implemented in your version of **DOS**, you'll get the message "Invalid parameter."

The batch file **QUICKFMT.BAT**

shown in Figure 3 uses the /H switch to format a lot of disks, fast. Put blank disks in both drives before you start it. It alternates between drives A: and B:. As soon as one drive finishes, just put another disk in it. The /H switch makes formatting start immediately, and the **ECHO N** pipes a "No" answer to the final "Format another" question. When you stop putting disks in the drives, the batch file will quit.

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■ EDITED BY CRAIG L. STARK

# POWER USER



*Produce month names in foreign languages by patching WordStar; avoid blank lines in WordPerfect merge output; count words in all or part of a Microsoft Word document.*

## Get a quick word count of a complete or partial document in Microsoft Word

Microsoft Word will count the words in a document when you repaginate, but its procedure is less than elegant. If you use the function-key command, Ctrl-F9, you must confirm each page break. If you use the menu commands

<Esc>PR<Enter>

you have to type four keystrokes where one or two should do. If you record the menu commands as a macro, on the other hand, you'll never see the word count, since Word quickly overwrites it with its "End of macro" message.

The solution is easy enough to overlook—just redefine Ctrl-F9 to read

<Esc>PR

To run the macro, type Ctrl-F9 and press Enter. Word prints its "End of macro" message after it goes to the repaginate menu but before it repaginates. Then,

when you hit Enter, Word repaginates and sends by showing you the word count.  
—John Britton; New York, New York

This tip solves one problem at the cost of possibly introducing another. Users who move their edits to the end of a text won't want the edits to be included in the document word count. Fortunately, Word gives you an easy way to exclude such chunks of text by formatting them as hidden. The pair of macros shown in Figure 1 will automate that procedure.

The first macro sets the current window not to show hidden text. It then goes to the top of the document, turns on the extend selection feature, and reminds you to select the text to be excluded from the word count. When you finish selecting, you hit Return. The macro formats the text as hidden, jumps to the end of the document, and repeats the selection procedure. With the text marked, the macro goes to the repaginate menu and waits for you to hit Return.

After you get your word count, you invoke the second macro. This highlights the

hidden text marker at the end of the document, reformats it as standard text, then goes to the hidden text at the top of the document and reformats it.

Note that the second macro will also reformat any text in the excluded portions that you had originally marked as hidden. If you use hidden text often enough for this to be a problem, you should save your document before running the first macro, then retrieve the saved version instead of running the second macro.—M. David Stone

## Using a simple technique to ensure file security can create unexpected problems with other programs

Colin Cohen's idea of inserting a CHR(255) in a dBASE filename to keep snoopers from gaining access to them (Power User, May 17, 1988) has the virtue of simplicity, but it can produce some unforeseen and undesirable consequences:

■ PC Tools (Central Point Software) does not recognize any filename that includes an ASCII 255 character. Any such files will not be listed when viewing a directory and cannot be uncerated by that program if accidentally deleted. (The Norton Utilities does recognize them, however, so you can use Norton's Undelete if necessary.)

■ While XTree and XTreePro (Executive Systems Inc.) will list files that contain ASCII 255 characters, you cannot enter an ASCII 255 character at any of these programs' prompts. Therefore, you cannot rename such a file or issue a file specification

```
<esc>W0<tab 2>R<enter>
<ctrl pgup><F6><pause Move highlight to end of text to be
excluded, and Hit Return><alt x>
<ctrl pgdn><F6><pause Move highlight to beginning of text to be
excluded, and Hit Return><alt x>
<esc>pr

<ctrl pgdn><left><alt x><space><ctrl pgup><alt x><space>
```

Figure 1: Two macros used to exclude end-of-document edits from a Microsoft Word word count.

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### ■ POWER USER

that includes character 255.

■ Be careful with *dBXL*, Diamond Version 1.2, from Wordtech. If you write a program using its built-in editor and the program contains a line in which the ASCII 255 character is produced by holding down the Alt key and typing 255 on the numeric keypad, the entire program will be truncated at that point. Just entering

```
USE pay<Alt-255>rate
```

is an invitation to disaster. The workaround is as follows:

```
filename="pay"+CHR(255)+"rate"  
USE &filename
```

This creates a memory variable that holds the filename on one line, then issues the USE command with a macro—and it won't truncate your file.—*Naseem F. Saab; Reston, Virginia*

Since the whole idea behind Mr. Cohen's suggestion is to make it more difficult for unauthorized people to get at these specially marked files, I should think *PC Tools*' and *XTree*'s difficulties in working with them is a benefit rather than a problem.

On the other hand, Mr. Saab's comments on *dBXL* prove "what a tangled web we weave when first we practice to deceive." *dBXL* uses the ASCII 255 character as its end-of-file marker. The internal editors in *dBASE III* and *FoxBASE* do not follow this dangerous practice, and neither does *SideKick*. Other text processors may present this problem, however, so test first to be safe.—*Brad Stark*

#### Eliminating blank lines in WordPerfect merge output

The merge facility of *WordPerfect*, Version 4.2, lets you avoid blank lines when a field in the secondary merge file is blank. The merge simply moves the next field up to fill the blank space. To activate this feature, you put a ? immediately after the field number; for example, "F2?". If field 2 is blank in a given record, the merge simply brings in the next field that has information in it or has no ?.

A problem arises, however, if two or three fields are on the same line and the next field is on a different line. Assume

that the last of the fields on the same line has a ? and is blank in a particular record; for example,

```
"F1": "F2?" "F3?"  
"F4"
```

If field 3 is blank, field 4 takes its place before the hard return that ends the line, which is probably not what you wanted.

The solution is to fill all the blank fields with a symbol or word not otherwise used in the document; for example, M@rk. Then, after the merge, just search and destroy the mark.—*Dennis J. Tuchler; University City, Missouri*

The line-skip feature isn't really meant for fields that share one line. Even if you replace the "F4" line in the example with some text, the text will still move up to the previous line when field 3 is blank. The best use of this feature is to avoid blank lines when each field gets a single line; for example, for labels.

A standard label might have four possible lines: name, company name, street address, and city/state/ZIP. Some records might omit the name, some the company name, and some might not even need a street address. If you use the ? in each field, your labels will not have any blank lines.—*Neil J. Rubenking*

#### Productivity Tip

In *WordPerfect* 5.0, hitting the List Files key twice (<F5><F5>) brings back your previous file list. This undocumented feature works only on hard disks, and the file list is not updated to reflect files added since your last list, but it's quite handy if you want to check the same filespec repeatedly, for example,

```
C:\LETTERS\*.WP
```

#### Patch the WordStar 4.0 date macro to produce month names in Spanish or some other foreign language

Spanish-speaking users can appreciate the ease with which *WordStar* lets you make use of foreign-language characters such as á, í, ó, ú, and ñ in your text. Here's a patch

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that modifies the <Esc>@ macro so that it will produce dates in Spanish, as well.

First make a copy of the WSMGS.OVR file and put the original safely away. Then, using the copy, load DEBUG with the command

**DEBUG wsmgs.ovr**

At the DEBUG prompt, give the search command

**s 0000 ffff "January"**

DEBUG will return an address in the form xxxx:yyyy:yyyy is the number you want.

To confirm that you've found the proper spot in the file, enter the command

**d yyyy**

DEBUG will dump the information from that address. The right side of the screen should then show the month names from January through December. You can now edit the month names by entering

**e yyyy**

and carefully typing the following:

```
45 48 65 72 6F 6D 46 65 62 72 65 72 6F
4D 61 72 74 6F 6D 61 62 72 6F 6D 6D 61
79 6F 6D 4A 75 68 69 6F 6D 4A 75 6C 69 6F
4D 61 67 6F 73 74 6F 6D 53 76 74 6F 65
6D 62 72 65 6D 4F 63 74 75 62 72 65 4E
6F 76 69 6D 6D 62 72 65 6D 44 69 63 69 65
6D 62 72 65 6D <enter>
```

These are the ASCII codes, in hexadecimal, for the months in Spanish. At this point you might like to check that you typed everything correctly. Again enter the command

**d yyyy**

You can now proofread the edit. Finally, write the changed file to disk by typing W and pressing Enter. Then, quit DEBUG by typing Q and hitting Enter. If you have typed everything correctly, the <Esc>@ command will now enter the current date in Spanish.—Carlos and Julia Gorricho; Naples, Florida

Two comments come immediately to mind. First, it should be obvious that you can do the same thing for other foreign languages, as long as you know the ASCII codes for the proper spelling of the months, and the total number of letters that will fit into the area reserved for month names. Note that the end of each month is designated by 0D; hence you don't have to

worry about the length of each individual month.

Second, if you write both in English and Spanish, you will probably want to retain the English version of the date macro along with its Spanish counterpart. You can do this easily enough by maintaining two versions of the WSMGS file in your WordStar directory and calling up the appropriate one with either of two batch files.

Name the two WSMGS files WSMGS.ENG and WSMGS.SPN. Now create the batch file WSE.BAT:

```
ECHO OFF
COPY WSMGS.ENG WSMGS.OVR
WS
```

and a second batch file WSS.BAT:

```
ECHO OFF
COPY WSMGS.SPN WSMGS.OVR
WS
```

If you load WordStar with the batch files, WSE will always use the English version of WSMGS, and WSS will always use the Spanish version.—M. David Stone

## Productivity Tip

When creating a dBASE III index to store on a floppy, it's faster to create the index on your hard drive and use DOS to COPY it than to create the index directly on the floppy in one step. This is true in Clipper and FoxBASE, too. The reason is that dBASE reads and writes in 512-byte sectors while DOS's COPY reads and writes the complete file (or as much as RAM can hold) all at once. The same applies to dBASE's COPY FILE. It's a snail compared with DOS's COPY.

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■ EDITED BY ROBERT L. HUMMEL

# LANGUAGES

*How to break out of an endless loop in Turbo Basic; a Turbo C function that can directly access the video buffer; an efficient way to sort large files in BASIC.*

## A fast way to write directly to the video buffer within Turbo C

The standard C library provides a number of functions for printing to the screen: `printf()`, `puts()`, and so forth. I found them slow, however, and wanted a function that would take advantage of the speed of writing directly to the video buffer. The function `qwrite()` shown in Figure 1 displays a string with a specified attribute to any row and column on the screen by performing a high-speed write to the video screen buffer. It detects the use of a color or monochrome monitor so that it writes to the correct buffer and waits until a vertical retrace of the screen is in progress to prevent "snow" on the CGA screen.

Because the `qwrite()` function accesses the video memory directly, the string can be placed on other screen pages as desired by simply using row values that are greater than 24 (the rows of the first page fall between 0 and 24). The `qwrite()` function returns the offset of the beginning of the string in the video buffer. —Donald R. Winslow; San Pedro, California

Mr. Winslow's `qwrite()` doesn't really restrict the portability of your programs if you use it wisely. To create a version of `qwrite()` for other hardware environments, you can substitute the innards of `qwrite()` with ANSI.SYS escape sequences to position the cursor, and then call `printf()` in order to print the string. This means you can use `qwrite()` throughout your programs to

do string prints at a specified screen row and column.

There are a couple of interesting points to be noted about how this function operates. First of all, Mr. Winslow uses a far pointer to an integer to access the video buffer; this is useful since a character and attribute can be modified at the same time. Also, the byte at offset 049h in the BIOS Data Segment (which begins at Segment 040h) determines whether the monochrome or color video buffer is active.

Finally, two "while" loops are employed to check the vertical retrace activity on color monitors. The first loop inspects the vertical retrace bit from the video card to see if a retrace is in progress, forcing the program to stay in the loop until the retrace has ended. Then, the second loop forces

```

/* qwrite.c
 */

int qwrite(int row, int col, char attrib, char *string)
{
    extern int far *scrptr;
    int far *scrptr;
    register int j;

    row += 80; /* reset row far offset into video buffer */
    row += col; /* add column offset to get to first byte */

    if(!string[0]) /* if no bytes to be written, return */
        return row;

    scrptr = scrptr + row;
    if( scrptr == (int far *)0x00000000)
        scrptr = (int far *)0x00000000;

    /* get attribute into 0x and while not end of string */
    for( j = 0, _0x = attrib; string[j]; j++)
    {
        _0x = string[j]; /* get character into 0x */
        scrptr[j] = _0x; /* poke then into the buffer */
    }
    return row;
}

#ifdef VGA
/* qwrite.c */
/* get address of video post */
/* wait if retrace is in progress */
while( (inp0x049) & 0) == 0;

/* wait for next retrace */
while( (inp0x049) & 0) == 0;

/* get address of video post */
/* wait if retrace is in progress */
while( (inp0x049) & 0) == 0;

/* wait for next retrace */
while( (inp0x049) & 0) == 0;

/* test for mono */
scrptr = (int far *)0x00000000; /* set pointer to mono screen buffer */
else
    scrptr = (int far *)0x00000000; /* set pointer to color screen buffer */

main()
{
    int i,j;

    init_scrptr();

    for( i = 0; i < 24; i++)
        qwrite(i,0x07, "This is normal video");

    for( i = 1; i < 24; i++)
        qwrite(i,0x07, "This is retrace video");

    for( i = 0; i < 24; i++)
        qwrite(i,0x07, "This is normal video");
}

```

Figure 1: `QWRITE.C` provides some primitive tools for access to the video buffer.

## ■ LANGUAGES

the program to wait until the next retrace has begun. By taking this approach, there is usually enough time to update the entire video buffer (4K in size) before the retrace ends.

I've taken the liberty of breaking the original `qwrite()` function into the parts

shown in Figure 1. While the `qwrite()` function performs the string-to-screen writes, I've broken the screen mode detection out into a function called `Init_scrptr()`, which sets the far pointer `scrptr` to the appropriate screen buffer. This function should always be called once in your pro-

gram prior to calling `qwrtre()`. It reduces the overhead redundancy of checking for screen mode and resetting the pointer each time `qwrtre()` is called. I also placed the video retracing detection in the function `WaitForRetrace()`, which allowed some streamlining of the program logic. In addition, `WaitForRetrace()` can be called by any other function that needs video retracing detection capabilities.

The sample program shown in the listing (Figure 2) demonstrates the use of `qwrite()` by calling it in three loops to write a string in normal characters, then reverse video, and then normal again.—*Richard Hale Shaw*

## Better methods of writing sideways text in BASIC graphics modes

Marvin Larsen's side-writing program (Languages, January 26, 1988) was good.

```
main()
{
    int i,j;

    Init_sprctr();

    for( i = j = 0; i < 24; i++, j++)
        qwrite(i,j,0x7, "This is normal video ");
    getch();
    for( i = j = 0; i < 24; i++, j++)
        qwrite(i,j,0x70, "This is reverse video");
    getch();
    for( i = j = 0; i < 24; i++, j++)
        qwrite(i,j,0x7, "This is normal video ");
}
```

**Figure 2:** This demonstration program shows the capabilities of the `qwrite()` function

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## ■ LANGUAGES

but it was written for use with Turbo Pascal. I have written a BASIC version that improves on the original in several ways.

Rather than read the character shapes from the font table in ROM, the SIDEWRIT .BAS program, which is shown in Figure

3. captures each character directly from the screen.—*Marc Veilleux; Thetford Mines, Quebec, Canada*

[illegible]

**Figure 3:** A sample QuickBASIC program to print text sideways in graphics mode.

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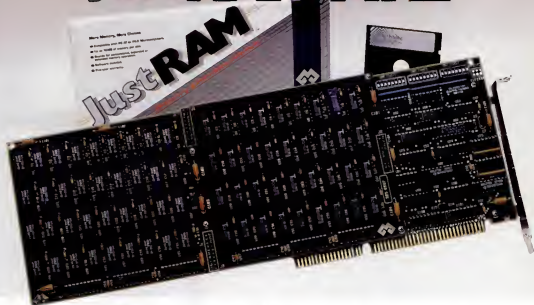
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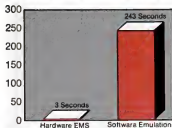
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## ■ LANGUAGES

Mr. Veilleux's program does indeed do much more than the original submission. Text can be displayed in two sizes, in normal or italic, and at any orientation. As submitted, the program was written for use with a CGA video display monitor; I have added comments showing how it may be adapted for an EGA display monitor. In this case, the range of colors is not limited to the three used in the demo.

I retained the original French variable names because I think they're cute—you can change them if you'd like. *Mot\$* would become *Word\$*, *Nombre* would be *Number*, but *Couleur* would have to be *Color* because *COLOR* is a BASIC reserved word.—*Ethan Winer*

## Productivity Tip

When a BASIC program writes data to a file, it usually isn't sent to the disk right away. If the power goes off or the PC locks up, your file will end up with lost clusters and no data. Make it a practice to periodically close and then reopen important files, just in case of a power outage.

## A method for sorting huge files using BASIC

I recently needed to sort a huge database file containing about 70,000 records. I tried unsuccessfully to use a commercial sorting program; it failed because all of the data wouldn't fit in memory. In the absence of any other alternative, I wrote the *QSORTFL.BAS*, shown in Figure 4. Even though it took overnight to complete, it sorted the file correctly.—*Wie Lim; Lakeland, Florida*

Sorting huge data files is usually a complicated proposition, and this solution, although not particularly fast, does the job. Rather than attempt to load all of the records into an array and then sort the array, this method simply compares all the disk records and then swaps them accordingly. One advantage to this approach is that it does not require a temporary work file, which would require free disk space equal to the size of the file that's being sorted.—*Ethan Winer*

## Productivity Tip

You can zero out a Turbo Pascal variable of any type using the *FillChar* procedure. For example, `FillChar(X, Size Of(X), 0);`. This is much faster than zeroing out each individual element of an array or each field of a record.

## How to end frustration when caught in an endless loop

I really enjoy writing programs in Turbo Basic, but one of its most frustrating limitations is not being able to use the Ctrl-

Break combination if my program winds up in an endless loop. To avoid this problem, I have written *BREAK.INC* (Figure 5), an *\$Include* file that allows a program to break out of nearly any situation without having to reboot.

The *BREAK.INC* file should be included at the very beginning of your programs while they are being developed. Then if you get into a situation where the Ctrl-Break combination does not respond, simply press the F10 key instead to break out of the program. Please note, however, that both *SEVENT OFF* and *KEY(10) OFF* will prevent this program from working.—*Michael Wasek; Fallsington, Pennsylvania*

```
reclen = 31
OPEN "FILE.DAT" FOR RANDOM AS #1 LEN = reclen
FIELD #1, reclen AS rec$
FIELD #1, 3 AS junk$, 10 AS keyvar$
numrecs = LOF(1) / reclen

ind = 1
WHILE ind <= numrecs
  ind = ind + 1
  npass.req% = npass.req% + 1
WEND
PRINT "Number of passes required is: "; npass.req% - 1

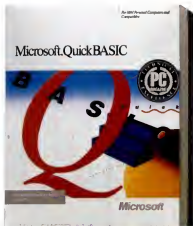
ind = (ind - 1) \ 2
WHILE ind
  npass% = npass% + 1
  LOCATE 2, 1
  PRINT "PASS being processed: "; npass%
  FOR i = 1 TO numrecs - ind
    J = i
    WHILE J > 0
      GET #1, J: varJ$ = keyvar$: recJ$ = rec$
      L = J + ind
      GET #1, L: varL$ = keyvar$: recL$ = rec$
      IF varJ$ > varL$ THEN
        LSET rec$ = recJ$: PUT #1, L
        LSET rec$ = recL$: PUT #1, J
        J = J - ind
      ELSE
        J = 0
      END IF
    WEND
  NEXT
  ind = (ind - 1) \ 2
WEND

BEEP
PRINT "Done";
CLOSE
```

Figure 4: A program to sort data files that are too large to load into memory.

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tries to tell  
you that one  
language  
fits all, turn  
the page.

# To each



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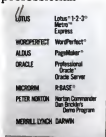


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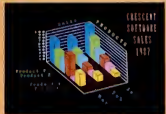
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```
'----- Break.Inc
ON KEY(10) GOSUB Break
KEY(10) ON
GOTO Skipover

Break:
END
Skipover:
```

Figure 5: A Turbo Basic \$Include file to stop a program when Ctrl-Break fails.

This is a simple and elegant solution to a nasty problem that has always troubled programmers using Turbo Basic. Since the Ctrl-Break combination is ignored by Turbo Basic unless it is performing I/O such as INPUT or PRINT, programmers have traditionally had to reboot to regain control, very often losing any work that was in progress. If your program includes event trapping that also uses the F10 key, you could use any of the other trappable keys instead.—Ethan Winer

## Productivity Tip

Usually, programs that are written to be displayed on a color monitor will not look very good on a monochrome monitor. For example, the color blue shows up as underlined on a monochrome monitor, and nonwhite backgrounds are often unreadable. The easiest way to detect the type of monitor that you are using in a BASIC program is to examine low memory in the following way:

```
DEF SEG = 0
IF PEEK(&H463) = &HB4 THEN
  'monitor is mono
ELSE
  'monitor is color
END IF
```

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## PC TUTOR

Use the KEY-FAKE utility to toggle the DOS printer echo function; count the occurrences of individual letters in a message with **FREQ.COM**.

Using **FREQ.COM** to display character counts

As part of my job, I must occasionally write a sign using movable letters. After composing the message on-screen, I need to count how many of each letter to bring

out to place on the sign board. A program that could count how often a given character appears in a passage would be very helpful.—*Stephen A. Smith; Pasadena, Maryland*

Computers were made to help relieve us from boring, nonproductive tasks. Count-

ing letters fits nicely into this category. **FREQ.COM**, which is shown in Figure 1, is a short assembly code program that reads the command line and displays a count of all alphabetic characters entered. The largest message that can be counted is limited by the 127-character maximum length of the command line.



```

;-----
; freq.com - count the letter frequency on the command line
; PC Magazine - PC Tutor
;-----
CSEG SEGMENT PARA PUBLIC 'CODE' ;start CODE segment
ASSUME CS:CSEG,DS:CSEG,ES:CSEG,SS:CSEG ;set by DOS Loader
CORG 1000H ;COM file format

ENTRY: JMP MAIN

CS EQU 000
DS EQU 000
ES EQU 000
SS EQU 000

COPYRIGHT DB "FREQ 1.0 (c) 1988 Communications Co.,Ch,LF
DB "PC Magazine ",254," Robert L. Hummel",Ch,LF,"-",26

USAGES DB "Usage: FREQ text",Ch,LF,"$"

ASC DB 26 DUP(0)

MAIN PROC NEAR
    MOV SI,OFFSET COPYRIGHT
    MOV AX,0
    INT 21H

    MOV CX,CX
    MOV CL,DSI[0000] ;here high byte
    OR CL,CL ;Get command line length
    JNS SAVE_INPUT ;if > 0
    ; count letters

    MOV DI,OFFSET USAGES ;address of message
    MOV AX,0
    INT 21H ;Display string
    MOV AX,4C01H ; thru 000
    INT 21H ; Terminate with error
    ; Thru 000

    MOV SI,0
    MOV AX,0
    INT 21H ;Start of command tail
    ;here high byte of index

    MOV AL,255 ;Get character in AL
    SUB AL,26 ;Make lower case
    CMP AL,25 ;Convert to empty
    JA NEXT
    MOV BL,AL
    INC BYTE PTR ASC[BL] ;Put into BL
    ; to use as index

    LOOP READ_CHAR ;Scan entire line

    MOV SI,OFFSET ASC ;offset of table
    MOV CL,26 ;Number of entries
    MOV BL,0 ;BL = 0

    PR_CHAR: MOV AX,2 ;Write TTY

    MOV BL,CX ; carriage return
    INT 21H ; thru 000

    MOV AX,2 ;Write TTY
    MOV BL,LF ; line feed
    INT 21H ; thru 000

    MOV BL,0 ;Build character in BL
    INC BL ; move char counter
    ADD BL,"A" ;Make ASCII value
    MOV AX,2 ;Write TTY
    INT 21H ; Thru 000

    MOV AX,2 ;Write TTY
    MOV BL,SPACE ; a space
    INT 21H ; Thru 000

    LODSB ;Get character count
    CALL BYTE2DEC ;Print as decimal number

    LOOP PR_CHAR ;Continue for entire table

    MOV AX,4C06H ; Terminate program
    INT 21H ;Thru 000

MAIN ENDP

;-----
; binary to decimal conversion. arguments 0 - 99 in AL
; Destroys AX, BL
;-----
BYTE2DEC PROC NEAR
    MOV AX,AX
    AAM ;Make them ascii
    OR AX,"09"
    PUSH AX
    MOV BL,AX
    MOV AX,2 ; carriage return
    INT 21H ;Write TTY
    POP AX
    MOV DI,AL
    MOV AX,2 ; thru 000
    INT 21H

    RET

BYTE2DEC ENDP

CSEG ENDS
END ENTRY

```

Figure 1: A program that reads the command line and counts the number of times a given letter appears.

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## PRODUCTIVITY

### ■ PC TUTOR

#### Why you must reboot when uninstalling device drivers

Is there a way to uninstall device drivers that are loaded with CONFIG.SYS without rebooting the computer? I have several programs that require large device drivers to be loaded at boot time. But if I load all the drivers I would like for all the programs I have, I won't have enough memory to run some of my programs.

I need a new device driver only for the particular program that is running at that time. The others are just wasting memory. It would be nice to switch applications (and device drivers) without editing the CONFIG.SYS file and rebooting each time.—Steven R. Donaldson; Charlottesville, Virginia

Unfortunately, the tools that DOS provides for installing device drivers and memory-resident utilities are strictly one-way. There is no built-in support for uninstalling device drivers without rebooting the computer.

Memory-resident programs are installed after the system configuration has stabilized and DOS has fully installed itself. They generally splice into an interrupt vector and then stay resident, essentially becoming an operating system extension. Popular terminate-and-stay-resident management utilities like *PC Magazine's* INSTALL and REMOVE (Utilities, August 1987) can trace the memory allocation chain and forcefully remove these utilities. The program PCMAP, in the same issue, shows one method of tracing the chain and displaying the programs installed in memory.

Device drivers also extend the operating system and are a special form of memory-resident program. They can do most things their terminate-and-stay-resident cousins can—splice into vectors, allocate memory, manipulate hardware, and so on. But they are locked more tightly into the structure of DOS in that they are installed in the chain of device drivers.

Once the processing of the CONFIG.SYS file is complete, the driver chain is a closed, linked list. Each time DOS requires service from a device, the device driver chain is searched for the correct

driver, and the request is passed along.

Block device drivers, like VDISK, can't be installed or removed practically. DOS assigns these devices a drive letter (such as D:) and integrates them too thoroughly. Removing them would require major surgery and probably cause a crash. But it's possible to design a utility that would allow certain character device drivers, like ANSI.SYS, to be installed and removed after DOS has finished loading. A program that would allow management of device drivers is too involved for a PC Tutor column, but if enough readers express an interest, we might be persuaded to publish it in the Utilities column.

#### Toggle the DOS printer echo from inside a batch file using the KEY-FAKE utility

I am working with a piece of special scientific software written in FORTRAN. The output from the run goes only to the screen. It's not practical to rewrite the program to produce a printed copy as well. So, to get a copy of the output, I must use the Ctrl-PrtSc function, toggling it on before running the program and off afterwards.

A friend pointed out that the Ctrl-P key combination has the same effect as Ctrl-PrtSc, something I have never read about. I would like to be able to toggle this function from a batch file. I've tried to use the KEY-FAKE program but could not find the right combination of codes. Any suggestions?—Dexter Wang; Concord, Massachusetts

The KEY-FAKE utility, written by Charles Petzold and published in the Utilities column of the December 24, 1985, issue of *PC Magazine*, allows keystrokes not normally available at the command line or in batch files to be "stuffed" into the keyboard buffer before a program executes.

In the situation you describe the key you want to fake is the Ctrl-P combination. This causes DOS to echo output sent to the screen to be routed to the printer as well. Note that because the printer echo function is a DOS function, only output handled by DOS can be echoed. You can discover by

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## ■ PC TUTOR

```
ECHO ON
KEY-FAKE 16
REM This line should print
KEY-FAKE 16
REM This line won't print
KEY-FAKE 16
REM Print this line
KEY-FAKE 16
REM Turn off printer echo
```

**Figure 2:** This batch file demonstrates how the KEY-FAKE program can be used to toggle the printer echo function.

experimentation whether the program you are using works through DOS.

To find the correct code to use as an argument to KEY-FAKE, I used the BIOS.COM program (PC Tutor, October 27, 1987). The BIOS value for Ctrl-P is 10h, or 16 decimal. Figure 2 shows a batch file that demonstrates how the KEY-FAKE utility can be used to toggle the printer echo function on and off.

### Possible conflicts between the prompt command and head-parking programs

I use the PCPARK2.COM program (PC Tutor, March 15, 1988) to safely park my hard disk's heads. I also use the command PROMPT \$P\$G so that the current drive and subdirectory are always visible on my screen. But I've noticed that when the current drive is a floppy, it is accessed each time that a command or program finishes executing and the prompt is redisplayed. This disk access occurs even when using internal commands, like CLS, which cause no disk access.

If DOS must verify the subdirectory by accessing the disk before displaying the prompt, then parking the heads (and having them stay parked) can be accomplished only by resetting the prompt command or by simply not using \$P. Have I uncovered a trap that catches thousands of hard disk users?—Jon Maloney, Anderson, South Carolina

The contents of the PROMPT command are read from the environment and interpreted each time the prompt is displayed. When the \$P option (used to display the

current drive and directory) is encountered, DOS must determine and build the pathname internally before displaying it. Some of this information is easy to acquire. A number representing the current drive is stored in a byte located in the transient portion of COMMAND.COM, and no disk access is required to retrieve it. The drive number is converted to a letter before display. But to determine the current directory, COMMAND must call DOS function 47h, Get Current Directory. The action taken by this function depends on whether the current drive is a floppy or a hard disk drive.

DOS separates disk devices into two categories: removable (such as floppies) and nonremovable (such as hard disks). When working with removable media, DOS takes the most conservative approach and assumes that you may have changed floppies since the last disk activity. If the floppy has been changed, any information relating to that disk, including the previous current directory, is not valid any longer. A floppy disk must be read, therefore, to determine if it has been changed before DOS reports the current directory. Because the PROMPT options are interpreted each time the prompt is displayed, a drive marked as removable will be accessed even if no command has been executed.

Hard disks, on the other hand, do not suffer from this uncertainty. Because they are marked as nonremovable and DOS controls all normal access, there can be no surprises. The current subdirectory is simply retrieved from an internal data area and returned to the function. Because this does not require a disk access, the heads will not have moved, and the drive will still be parked.

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■ FRANK J. DERFLER, JR.

# CONNECTIVITY CLINIC



*How to transfer files and share disks between old and new PCs; share a CD-ROM database on a network; a full explanation of IBM's LU 6.2 and APPC concepts.*

## An explanation of IBM's LU 6.2 and APPC concepts

I have read press releases in other magazines about micro-to-mainframe products that use IBM's LU 6.2 and APPC. Could you explain, in terms somebody who hasn't swallowed an IBM dictionary can understand, what LU 6.2 and APPC are and what they do?—Ronald Glass; River-side, Illinois

You should understand that all these terms have three functions. First, to give the illusion that all this is magic and only a selected cult of initiates can manage it. Second, to give the designers, manufacturers, and sellers an easy way to refer to these products. And third, to keep things more or less proprietary. But let's see if we can blow away some of the smoke and deflect the light from the mirrors.

IBM designed an architectural plan for linking together terminals and computers called Systems Network Architecture, or SNA. Pieces of SNA appeared in the early 1970s in bank terminal computers, so the architecture has undergone a lot of changes along the way.

For example, a major communications link in the SNA scheme was an RS-232C line, which was controlled by a set of rules in the Synchronous Data Link Control (SDLC) protocol. More and more, this simple RS-232C line controlled by the widely understood and emulated SDLC protocol is being replaced by the IBM Token-Ring LAN.

This move from centralized simplicity to distributed complexity is well orchestrated by IBM. It is successfully increasing and distributing computing power without taking the processing load off the mainframe or the heat out of mainframe sales. The APPC and LU 6.2 concepts are an important part of the move toward distributed computing.

In the documents that describe SNA, IBM refers to network nodes as Network Addressable Units (NAU). Each NAU has two kinds of pieces—the Physical Unit (PU) and the Logical Unit (LU). It helps to think of a PU as a communications port and an LU as a program driving that port. Sometimes several LUs can work through a single PU.

I should point out that IBM has renamed Physical Units and now calls them Node Types. However, almost all of the advertising and product literature still refers to PUs.

In IBM's SNA scheme, PU 2 designates a terminal cluster controller with certain communications characteristics. PU 4 designates a communications controller or front-end processor. PU 5 is a host processor. In the move toward distributed computing, IBM found that the description of PU 2 didn't include enough capabilities. So, it introduced PU 2.1, which is more flexible and allows more human interaction in the communications process.

Similarly, there are lots of different LUs. Logical Units 1–5 describe various kinds of programs operating within display terminals. LU 6 generally describes how mainframe programs talk across a commu-

nications line controlled by PUs. LU 6.2 describes how programs of all types, including PC and mainframe programs, communicate. Programs that follow the LU 6.2 specification need a PU 2.1 port to work through.

LU 6.2 is a protocol that makes another IBM concept called Advanced Program to Program Communications (APPC) come alive. APPC, in turn, is part of an even thicker stack of books describing IBM's Systems Application Architecture, or SAA. APPC describes how programs talk to one another; SAA describes how programs talk to everything including people.

Many LAN managers should be interested to note that there is essentially no room for NetBIOS in the APPC specification. Today, NetBIOS is the primary way that programs talk to one another across a PC-based LAN. But NetBIOS was not and is not part of IBM's strategic plan. It was developed to glue together the hardware and software of two other vendors that IBM wanted to market under its logo. The folks who developed NetBIOS did a fine job and it has grass-roots popularity, but it isn't in IBM's master plan.

Because APPC is a standard that describes how any programs running in any environment can exchange data anywhere, utilities and services that follow the APPC specification are big. IBM's APPC/PC, released in 1986, was about 300K. Because NetBIOS was designed only to work within a PC-based LAN, its modern implementations can be as small as 20K. IBM may try to lose NetBIOS in its move toward APPC/LU 6.2 and distributed computing,

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but there are good reasons to continue to support this practical network service.

### Sharing disks and transferring files between old and new IBM PCs is easy

I have the job of linking our old IBM PC-XT with our new PS/2 Model 80. To share the disk of the Model 80, do I have to find the right LAN card for the PS/2 and set up all that networking software?—Mike Hixon; Montgomery, Alabama

I get as many letters asking for a simple way to share drives between two PCs as I get on any other topic. If people need to simultaneously share the same data files, then an easily installed LAN such as LANtastic from Artisoft or DCA 10NET is the best solution. But if you only need to share drives and printers without simultaneously

sharing files, then even simpler alternatives are available.

The disk drives and expansion slots on the XT and PS/2 Model 80 are very different, but their serial ports are the same. Linking through the serial ports isn't the fastest way of moving data, but it is the simplest and most inexpensive method.

There are several good products available that link various kinds of PCs and PS/2s through their serial ports. One good package is ManyLink from NetLine. This \$165 product includes the connecting cable and all the software you need for a two-station link.

The product we use almost every day in the PC Magazine LAN Labs to transfer data between machines is Desk-Link from Traveling Software. Desk-Link has the same nice DOS shell system that helps make Lap-Link popular. Like ManyLink, Desk-Link comes in a single box with all the software, cable, and connectors you

need to set up a resource-sharing link between two machines in about 15 minutes. Desk-Link retails for \$169.95.

If you have big files to load and transfer (50K or more), you may run out of patience with the speed of RS-232C attached devices. In this case, I recommend LAN-Link 5X from The Software Link. LAN-Link 5X is faster because it moves data via the parallel printer ports. However, it is also more complex to set up than Many-Link or Desk-Link and, at \$595, it is more expensive. But it is fast, and you can connect more than two computers.

All three packages work similarly in that they give each machine the ability to use the disk drives and attached printers of the other machine in background mode. In this reader's letter, for example, the operator of the XT will see the Model 80's hard disk as a D: drive on the XT. Someone using the Model 80 can run programs while the XT is using the Model 80's drive or

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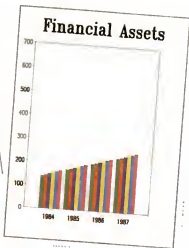
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printer. Each machine does pay a penalty in performance, but if the Model 80 is running DOS applications, you shouldn't be able to notice it. Although LANLink uses a server-satellite concept, the other two products allow two-way sharing of drives and printers.

### Sharing a CD-ROM database on a network

We are interested in using the new CD libraries that are becoming available, but the cost for a single user is still high. Can these devices be networked off of a server on a LAN?—David Burke; Greenbelt, Maryland

Sharing a CD-ROM database is a perfect way to use a LAN. However, there are two potential problems and I know of a solution for only one.

The first problem is legal. You should check the licensing of the CD-ROM very carefully to see if the data can be shared on a network.

Assuming that simultaneous use is not a problem, I know that several people have experienced compatibility problems between CD-ROM controller boards and LAN adapter cards.

One interesting solution comes from Meridian Data. It is now shipping a product called CD Net that sits on a network running under Novell's or MS-Net's software and provides multiple users with nearly simultaneous access to the same CD. Meridian sells various models of CD Net devices for different capacities, but the prices start at \$4,195.

For more information on the products referenced in this column, contact:

- NetLine Inc., 2155 N. 200 West, #90, Provo, UT 84604; (801) 373-6000.
- Traveling Software Inc., 18702 N.

Creek Pkwy., Bothell, WA 98011; (206) 483-8088.

- The Software Link Inc., 3577 Pkwy. Ln., Atlanta, GA 30092; (404) 448-5465.
- Meridian Data Inc., 4450 Capitola Rd., Capitola, CA 95010; (408) 476-5858.

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\*Starch Study, July 1986



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210A	87
Hitachi	Call
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Modium Viking	Call
NEC Multisync II	565
Multisync G3	185
Others	Call
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Line-By-Line	189
Carbon Copy Plus	105
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Line-By-Line	189
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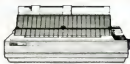
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- Exclusive SelectType front control panel puts popular printer features and SmartPark operations at your fingertips.
- The FX-850 prints 264 characters per second (CPS) in high-speed draft mode (12 CPI), 54 CPS in Near Letter Quality mode (12 CPI).



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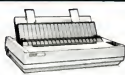
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## Epson LQ-850

- Epson's 24-pin, dot-matrix technology creates true letter quality characters
- Epson's SmartPark™
- Exclusive SelectType front control panel offers quick, easy selection of popular typesstyles, fonts and pitch
- 264 Characters per second in the high-speed draft mode delivers outstanding productivity
- 88 Characters per second in Letter Quality mode for enhanced, high-resolution characters
- In draft mode or Letter Quality mode, the LQ-850 runs at a surprisingly quiet 55 dB noise level



## Epson LQ-1050

- Epson's 24-pin, dot-matrix technology creates true letter quality characters
- Epson's SmartPark™
- 264 Characters per second in the high-speed draft mode delivers outstanding productivity
- 88 Characters per second in Letter Quality mode for enhanced, high-resolution characters
- In draft mode or letter quality mode, the LQ-1050 runs at a surprisingly quiet 55 dB noise level
- Exclusive SelectType front control panel offers quick, easy selection of popular typesstyles, fonts and pitch



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Putting these parts together is as easy as 1-2-3!!



First, lift off the top of the printer and locate the serial header socket.



Second, gently insert the I-O 8300.



Third, snap out the interface plate and plug in the 9-pin "T" connector.



Connect the system, and you're ready to go!

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317	Diablo Xerox Memorywriter	3.85
334B	Epson EX 10/20/35 M/S	4.85
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190EM	IBM 18/219 Displaywriter	12.35
	M/S OEM	12.35
222	IBM 6240 M/S	1.95
8120EM	IBM Quietwriter N/C	12.05
740	IBM Wheelwriter Corr.	3.85
730	IBM Wheelwriter M/S	8.65
320	IBM Selectric II H.Y. Corr.	1.75
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471	Okidata 84, 94	2.75
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955A	Seiko Universal Black/Red	1.15
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Citizen									9CM082 VGA	649	419		
120D	229	145	AST	LIST	FAST				Mitsubishi				
180D	259	165	Hot Shot 286	645	339				1409 RGB	399	259		
MSP40	449	299	Six Peck Plus 64K	210	119				1410 EGA	599	399		
Tribute 124	599	429	DTK						Diamond Scan 1381	799	489		
Tribute 224	899	599	286 10mhz M/B	499	249				NEC				
Dicenix			XT 1.2mb FDC	79	45				MultiSync II	899	575		
150P	499	299	Everex						MultiSync Plus	1399	869		
Epson			Call	1200B Int Modem	149	89				Princeton			
Futaba			Call	2400B Int Modem	249	129				Max15	389	389	
DL3400	995	549	Genoa						UltraSync	849	479		
NEC			Super EGA Hi-Res+	399	169				Ultra 16	1375	859		
P2200	569	339	Super VGA #5100	445	239				Seiko CM1430	995	599		
P5200	799	509	Super VGA Hi-Res #5200	645	359				Sony				
P5300	1049	669	Hercules						1302 Multisync	995	659		
LC890	4799	2999	Call	Graphic Card +	299	169				1303 Multisync	825	479	
Okidata			Intel						Zenith 1490	999	599		
182 Plus	319	219	8087-2	250	149				DISK DRIVES				
320	499	329	80267-10	480	249				MiniScribe				
390	699	469	Above Board 286	465	249				40MB AT #3650			499	319
393 (Req. Interface)	1399	915	Orchid						40MB AT MR335 22ms			825	399
Panasonic			Designer VGA	545	299				Mitsubishi				
KXP1080-2	299	159	Twinn Turbo 286	445	269				40MB AT #251-1			449	269
KXP1091-2	189	109	Twin Turbo 12mhz	645	359				Sharp				
KXP1124	529	315	Paradise						Toshiba				
KXP1595	749	419	AutoSwitch 480	349	169				20MB XT Kit #225			599	399
KXP1524	949	519	VGA Plus 16	399	259				30MB XT Kit #238			699	267
Star			VGA Professional	799	299				40MB AT #251			899	349
NK1000	269	169	Practical Peripherals						40MB AT #251-1			449	269
NK2400	499	319	1200B Int Modem	99	65				80MB AT #4096			1199	549
NB2410	899	449	2400B Int Modem	199	149				Toshiba				
Toshiba			Prometheus						360K Floppy			119	77
P321SL	749	459	Promodem 2400B	199	129				720K 3.5" Floppy			149	67
P341SL	999	629	Promodem 2400G	249	159				1.2MB 5.25" Floppy			149	67
P351SL	1499	929	Promodem 2400G	249	159				1.44MB 3.5" Floppy			189	100
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## SOFTWARE

Database			Word Processors		
LIST	FAST		LIST	FAST	
Clipper	699	Call	Easy Extra	99	55
Database	800	379	GE First Word Plus	199	117
dbase IV	485	449	Grammatik II	89	49
GBXL Diamond	199	105	MenuScript	495	349
Foxbase Plus	385	185	MultiMate Adv. II	565	247
Paradox	725	399	Professional Write	199	105
Quartz	795	449	RightWriter	95	49
RapciFile	155	179	Sprint	185	119
Release for DOS	700	419	Q & A Writer	199	119
Reflex	250	84	Webster's Writer	60	47
Q & A	349	179	Word	450	Call
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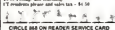
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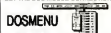
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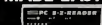
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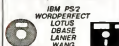
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**...AND THE WORST** Where would we be without a sense of humor? Executive editor Bill Howard shows no mercy as he lampoons the funniest developments in the industry over the past year.

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**VOICE MAIL** In the classic confrontation between man and machine, technology supplants the personal touch with voice mail systems. Find out which voice mail systems are really up to the challenge of managing your company's phones. Contributing editor M. David Stone examines seven PC-based voice mail systems.

**CONNECTIVITY** Local area networks allow many users to access the same sets of information. By bringing all that information together, a company places itself at great risk of losing everything, making backup a necessity. Workgroup systems editor Frank J. Derfler, Jr., and C. G. Milligan take a critical look at two tape backup systems that back up 2 gigabytes of data on a cartridge smaller than an audiocassette.

**COMPUTERS** The PS/2 Model 30 286, IBM's latest addition to the PS/2 family, raises some interesting questions. With the return of the AT bus, is it really a PS/2, or is IBM reversing its commitment to the Micro Channel architecture bus? Winn L. Rosch examines these questions in an in-depth analysis of the newest of the PS/2 machines.



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- x. 25 or less  
y. 26-99  
z. 100-499  
1. 500-999  
2. 1000 or more

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PC1227-4

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Business Phone (\_\_\_\_\_) \_\_\_\_\_

Company \_\_\_\_\_

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PC1227-3

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# AFTER HOURS



You can play any of eight variations of solitaire in *Solitaire Royale*. In the game of Pyramid (shown here), the object is to make pairs with a point value of 13.



## GAMES

### ***Solitaire Royale: A Card Game That Can Get You Hooked on Solitary Pursuits***

BY P. J. SPRINGER

As a native of Texas, which is known for its Wild Western days, smoky saloons, and vicious card games, I always keep my back against the wall whenever I sit down to play poker. With *Solitaire Royale*, I can now play cards, safe and sound, all by myself at my compassionate computer. For a friendly game—with or without the whiskey—you just can't beat it.

Choose from 10 different decks with exquisitely designed card faces—the colors are striking on an EGA. Then select one of eight varieties of solitaire; the computer does the shuffling and point calculation for you. Additional options include a fast or slow deal and a snap feature that automatically moves your cursor to new card piles. A mouse is supported, but a keyboard works fine enough.

Two of the most tempting features for a floundering player—and the ones that might get you shot in a real saloon card game—are the "Peek" and

"Back up a Move" options. Needless to say, these options saved my chaps a couple of times.

As I played, I found myself repeating the addict's familiar phrase: "Well, just one more game." Seemingly endless variations of solitaire—Klondike, Golf, Canfield, Corners, Pyramid, Calculation, Reno, and Three Shuffles and a Draw—beckoned me at every turn.

More-social card players than myself have the option of engaging in tournament play with friends, while serious buffs can compete in Aunt Anne's game, a sort of round-robin that includes all eight variations. The goal of the latter is to score the highest all-around total points.

*Solitaire Royale* can even turn the kiddies into compulsive card players. Three children's games are offered: Concentration, Pairs, and The Wish. Just set them up with their own PCs and let 'em go!

As for myself, I'll just try to beat the luck of the draw here in my quiet, safe, little office—back against the wall.

**List Price:** *Solitaire Royale*, \$34.95. **Requires:** 256K RAM, DOS 2.0 or later. Not copy protected. Spectrum HoloByte, 2061 Challenger Dr., Alameda, CA 94501; (415) 522-3584.

CIRCLE 004 ON READER SERVICE CARD



## HOBBIES

### ***Finding Your Fate in The Stars***

BY KAREN A. CARTER

Having problems with members of the opposite sex? Perhaps your Venus and Neptune are in opposition. Ever wonder why your coworker's projects are always on-target while yours often founder? Maybe you have an afflicted Mars.

Most people know only their sun sign (the constellation of the Zodiac that the sun was in at their birth). But how many of you know what sign the moon was in on your birthday or your ascendant (the constellation on the eastern horizon at birth), which astrologers consider to be as important as the sun sign?

Now there is an inexpensive program that can give you that information in minutes: *HoroScopics II*, \$29.95 from Zephyr Services. *HoroScopics II* can be used by beginners and expert astrologers alike, but be advised that some of the information it provides is very technical. However, the program does provide astrological background information and an explanation of key terms, which new users will appreciate.

To get your natal chart, all you have to do is type in information on the date, time, and location of your birth.

*HoroScopics II* then gives you the sky conditions at birth, including the position of the Sun, Moon, and eight major planets, as well as an interpretation of the chart according to astrological traditions.

The seven major planetary aspects are calculated, and the program provides interpretations for oppositions and conjunctions. *HoroScopics II* calculates the degrees between the major aspects more narrowly than most astrology books, allowing for only 5 degrees, compared with 8 to 10 degrees.

One problem with the program is that you must reboot to escape. And since full-screen editing is not supported, you can't change incorrect information once it has been entered.

For fun, you can also look up the charts of several famous people. But the program's main purpose is to provide quick, accurate chart information, and for that, it's a bargain.

**List Price:** *HoroScopics II*, \$29.95. **Requires:** 256K RAM, DOS 2.1 or later. Not copy protected. Zephyr Services, 1900 Murray Ave., Pittsburgh, PA 15217; (800) 533-6666 or (412) 422-6600 (in Pa.).

CIRCLE 003 ON READER SERVICE CARD

*HoroScopics II* divides a chart over two screens; the upper half of a chart, displaying ascendant degrees in the upper-right corner, is shown here.





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# AFTER HOURS

## PERSONAL FINANCE

### Quicken: A Powerful Program That Simplifies Checkbook Management

BY BILL HOWARD

A funny thing happened to *Quicken* on the way to your home. This \$49.95 check-writing and bank-account-balancing program from Intuit was kidnapped by businessmen looking for an easy single-entry accounting program that wasn't a complex time sink. The latest release, *Quicken*, Version 2.0, is so popular with business users that they account for more than half its sales today.

*Quicken* comes close to being idiot-proof. The two main screens you work from resemble a blank check and a checkbook register.

The new version offers a host of useful features:

- You can categorize expenses by placing phrases such as @Utility, @VISA, or @Medical on the comment line, and you can split any single check or deposit among several sources.
- You can memorize name, address, and account number information for recurring checks, then call them up by typing the

first few letters.

■ Financial reports such as budget, expense, and P&L reports can be subtitled by payee, category, and date. This feature makes small-business men think they've hit on the world's easiest accounting program. If you're using *Quicken* at home, it's a godsend come tax time.

■ There's room for the recipient's name and address; Intuit will sell you tractor-feed checks for 5 to 11 cents each. You can also buy laser printer checks in three-check sheets.

■ For recurring groups of bills, you can establish "transaction groups," for example, all bills you commonly pay in the last 10 days of the month.

*Quicken* abounds with nice little touches. You can keep several accounts at once. It doesn't care if you type 1700.6 or \$1,700.60 as the amount. A Billminder reminds you if there are checks you should write or print today. Checks can be found in 1 or 2 seconds.

*Quicken*'s one flaw remains the nature of your checks—they're paper, not electronic. The ideal would be your being able to use *Quicken* as the optional front end for an electronic home-banking system.

Because *Quicken* is so cheap, it makes sense for everyone with a checking account. *Quicken* is about as good as software gets: powerful, affordable, and easy to use.

**List Price:** *Quicken*, Version 2.0, \$49.95. **Requires:** 256K RAM, DOS 2.0. Not copy protected. Intuit, 540 University Ave., Palo Alto, CA 94301; (415) 322-0590.

CIRCLE 666 ON READER SERVICE CARD

By choosing a variable, such as Expense Ratio or Assets in Millions, an investor using *Business Week Mutual Fund Scoreboard* can compare funds in any fashion he desires.

Fund	Assets in Millions	Expense Ratio	Assets in Millions	Expense Ratio	Assets in Millions	Expense Ratio
1. Fidelity High Yield	1,465.0	2.43%	1.80	2.43%	1.80	2.43%
2. Fidelity High Yield	2,341.1	2.43%	1.80	2.43%	1.80	2.43%
3. Fidelity High Yield	3,782.4	2.43%	1.80	2.43%	1.80	2.43%
4. Fidelity High Yield	2,256.2	2.43%	1.80	2.43%	1.80	2.43%

## PERSONAL FINANCE

### Mutual Fund Scoreboard Helps You Make Money the Newfangled Way

BY FREDRIC BURKE

If you find talking to mutual funds salesmen or digging through the newspaper's financial pages tedious tasks, *Business Week Mutual Fund Scoreboard* could make planning your investments less tiresome. A year's subscription to the package (\$239.90 for four installments, published on a quarterly basis) puts comprehensive mutual-fund analysis at your fingertips.

The easy-to-use format allows you to access a large database of mutual fund information. Each installment of the package comes on two disks. One covers over 700 Equity funds; the other deals with Fixed Income funds, including over 500 government, corpo-

rate, and municipal bond funds. Funds can be rated from over 25 different perspectives, such as market performance ranging from 3-month to 10-year periods (alone or arrayed against any number of funds). You can

also compare your choices with the Standard and Poor ratings for similar funds, and with *Business Week*'s two specially developed risk criteria. Of equal importance are the fee and sales charge figures that are also included with the general fund overview.

Any user can perform informative fund analysis quickly: just print out the comprehensive help file as a step-by-step guide for taking full advantage of the database's flexibility. The data can be exported to *Lotus 1-2-3*, *ASCII* files, or *dBASE III* for further comparison.

It's no secret that research is an integral part of any investment decision. The prudent investor seeking to further diversify his portfolio will find that *Scoreboard* can make the job easier.

**List Price:** *Business Week Mutual Fund Scoreboard*, \$49.95 per disk; yearly subscriptions, \$149.95 for one disk, \$239.90 for both disks.

**Requires:** 256K RAM, DOS 2.1 or later. Not copy protected. *Business Week*, P.O. Box 621, Elk Grove, IL 60009-0621; (312) 250-9292.

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If you know how to fill out a blank check, you already have an idea of how to use *Quicken*. The two main screens resemble a blank check and a checkbook register.

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The 14th at St. Andrews



The 10th at Riviera



The 4th at Balnareil



The 13th at Augusta



The 15th at Muirfield



The 7th at Pebble Beach



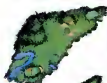
The 18th at Oakmont



The 12th at St. Andrews



The 10th at Augusta



The 11th at Merion



The 12th at Augusta



The 18th at Riviera



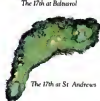
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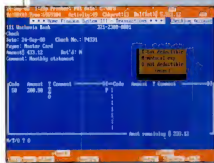
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# AFTER HOURS



Home Finance System III has room to allocate a check to several budget categories. You can enter category codes by name or by highlighting an entry from a pop-up window.

## Personal Finance

(continued)

spouse, and your computer to write checks with a minimum of confusion.

This program forces good record keeping by insisting that each deposit and check be allocated to one or more of its 100 income/expenditure categories. These may later be changed by the user from the account maintenance menu. Category codes are entered by number, by name, or by highlighting an entry from a pop-up window.

Checks are reconciled with your bank statement by entering a series of check numbers or by inspecting and marking individual checks. Both methods are efficient and work well.

**Home Finance System III** supports other types of asset accounts, including savings, stock portfolios, and IRAs. For example, you can first make a separate account for each of several CDs and then group them all under an IRA acting as a parent account.

The program also has reserve accounts, into which you can hide money from yourself for special purposes, and credit accounts, where you can record credit card and department store charges. Indeed, there are so many combinations and permutations of accounts that the program provides special menus for transferring funds among

them. Help screens abound and make the transfers almost fathomable to the lay person.

**Home Finance System III** is not without flaws. The reliance on a combination of commands, function keys, and Shift-function keys is somewhat awkward. And the overall organization is not as clear and clean as I would have liked. For example, it's necessary to go through five menus just to get to the check-writing screen. In addition, the check-entry screen does not look like a check and its clarity suffers accordingly.

**List Price:** *Home Finance System III*, \$99. **Requires:** 256K RAM, printer recommended, DOS 2.0 or later. Not copy protected. Jay Gold Software, P.O. Box 2024, Des Moines, IA 50310; (515) 279-9821.

CIRCLE 888 ON READER SERVICE CARD

## MoneyMate

Mindscape's \$69.95 *MoneyMate* is a class act. Its menu choices are clear, well organized, and written in plain, jargon-free language. "Work on Bank Account," "Work on Budgets," and "Work on Taxes" leave little doubt as to what each section does.

The user interface is also well designed. The software defaults to the most common entries (such as current date, next check number in sequence). Where choices are available, as in the selection of an account,

the Spacebar cycles through the options. The Esc key always backs up to the previous screen, and a mouse option is included to please the click and double-click crowd.

**MoneyMate's** check-entry screen, which is a graphical representation of a check, is just three steps away from the main menu. Full-screen editing makes corrections a snap.

Expenses and deposits are allocated to budget categories by typing the name or by selecting it from a pop-up window. It's not necessary to enter the full budget name—the program recognizes partials like "tel" for telephone and "med" for medical. *MoneyMate* also allows you to define new budget codes quickly, something other programs lack. Expense items may be identified as "one

features that a serious stock trader may require, savings accounts, credit cards, and stock portfolios are handled with finesse. For those on the fast track, a worth summary and a graph show how you're progressing (or not) from one month to the next.

A spreadsheet interface lets you export data to your favorite number-cruncher. A notepad feature lets you enter a date and a reminder; it's perfect for reminding yourself of quarterly tax payments, birthdays, and anniversaries.

**Personal Finances** with *Lotus* is good for doing specialized tasks but lousy at routine things like budgeting and managing a checkbook. *Home Finance System III* is a fine record keeper and a solid product, but *MoneyMate* is the real star and "buy"

The *MoneyMate* check-entry screen looks just like a check, full-screen editing allows for easy error correction. You can also allocate your expenses to budget categories.



time," "fixed repeating," or "variable repeating" (with a frequency ranging from bi-weekly to annually). The graphics and interface are so slick that even Scrooge would enjoy writing checks.

Check reconciliation seems a little weak at first. You cannot enter a string of check numbers; instead, you must inspect each transaction—but perhaps that's not a bad idea in the long run.

The quality of *MoneyMate's* checkbook carries over into its other features. Although the program lacks the analytical

of the three. In fact, it could give the heavyweight financial packages—*Andrew Tobias' Managing Your Money* and *Dollars & Sense* (see *PC Magazine*, After Hours, November 24, 1987)—a run for their money.

**List Price:** *MoneyMate*, Version 3.0, \$69.95. **Requires:** 256K RAM, printer recommended, DOS 2.0 or later. Not copy protected. Mindscape Inc., 3444 Dundee Rd., Northbrook, IL 60062; (800) 221-9884.

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the stock market game  
this way...



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And open up  
a whole new world...

07/25/1987				MyWay - Trading Module		15:40		
Portfolio Stock	ROYAL AMPC	MyWay v 1	Simulation Exchange	No	New York			
STOCK INVENTORY				PRICE MATCH				
Quantity on Hand	400.00	Buy...	100 Shares at	6.750				
Current Value	5450.00	Sell...	100 Shares at	13.625				
Profit (Loss)	3321.75	RECOMMENDATION						
Amount in Market	-2521.75							
Current Cash	8728.00							
Suggested Amount	2700.00							
LAST TRADE				STOCK CONTROL				
Date	07/24/1987	07/25/1987	Trade Amplifier	4000				
Price	13.375	13.625	Price Loading	1000				
THINGS TO NOTE				Trade Loading				150
Bought	5400.00	AVERAGE PRICE	Buy Amplifier	75				
Sold	5000.00	4.91	Sell Amplifier	25				
		11.62	Buy Amplifier	75				
			Sell Amplifier	25				
Exit Add Buy Delete Find Help Locate Modify Help Previous Report Sell								
Display and trading stock on file								
T2 Help								

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# AFTER HOURS

## PERSONAL FINANCE

### Financial Managers: Keeping Track Of Your Personal Accounts

BY DONALD B. TRIVETTE

Financial software comes in all flavors and levels of sophistication. There are programs that print checks and others that simply record the checks you write. Some financial packages are capable of completing a 1040 tax form and all of its schedules, while others do nothing more than create a list of deductions for you to present to your accountant. One program might analyze the performance of your stocks and bonds while another simply records your assets.

Income and capital are not the only factors to consider when picking a financial package. A millionaire with lots of tax shelters who employs an accountant may need only the simplest checkbook program, while someone of modest means who looks after all of his own financial affairs may want a more so-

phisticated program.

The key to choosing the right financial software is to find a package that has the features most important to you and your family. One of the midrange programs reviewed here might provide the options you need to keep your personal accounts in order.

#### Personal Finances With Lotus

Automated Reasoning Technologies' *Personal Finances with Lotus*—which also works with *Quattro*, *VP Planner Plus*, and *Surpass*—is a collection of 37 spreadsheets tied together by a common menu and a sophisticated set of macros.

The focus of any personal financial system should be the checkbook manager. The ability to assign checks and deposits to categories is central to good record keeping and budgeting. You will want to assign medical expenses to one code, for example, and interest payments to another; in this way you can summarize your expenses at the end of the year.

*Personal Finances* severely restricts the categories to which you can assign a check or a deposit. Income items are limited to 5 codes; fixed expenditures, like mortgage payments, to 5 more codes; and variable expenditures, like utility bills, to 11 codes.

Although other financial programs commonly have 100 budget items, this program supports a puny 16. The codes that it uses are cryptic single-letter

characters and can easily be forgotten.

But the program really shines in other respects. There is a Cashflow spreadsheet for income property, which factors in variables such as rent, mortgage payments, taxes, maintenance, and vacancies to project the present value and the net present value of equity growth for 30 years. Another nifty spreadsheet computes the maximum amount you should spend on the purchase of a house. It takes into consideration interest rates, taxes, insurance, and your annual income. But it lacks an adjustment for inflation, which is certainly a major con-

is a useful tool for figuring out how expensive a house you can afford, calculating your Social Security benefits, or computing any of a dozen other important values. But if you want a daily record keeper, budgeter, and checkbook program, avoid this product as you would a new tax.

**List Price:** *Personal Finances with Lotus*, Version 3.0, \$99. **Requires:** 256K RAM; *Lotus 1-2-3*, *Quattro*, *VP Planner Plus*, or *Surpass*; DOS 2.0 or later. Not copy protected. **Automated Reasoning Technologies Inc.**, 975 Oak St., #618, Eugene, OR 97401; (800) 289-7638.

CIRCLE 699 ON READER SERVICE CARD

sideration in buying a house.

Inflation is factored into another spreadsheet that is sure to be an eye-opener for anyone counting on Social Security for retirement. You'll find that if you were born in 1964, are currently earning \$25,000, anticipate that your salary will increase by 10 percent annually, and that inflation will increase at half that, then you can retire in the year 2029 with an annual monthly benefit of \$3,184. The bad news is that that amount will be worth only \$478 in today's dollars.

At \$99, *Personal Finances*

#### Home Finance System III

*Home Finance System III*, \$99 from Jay Gold Software, is a good record keeper that easily handles up to 100 checking accounts. If you have trouble remembering the name of your Swiss bank, for example, a touch of the F4 key pops up a window from which you may select any of the accounts you've entered. Each checking account can maintain three check-numbering systems—a nice touch that allows you, your

(continues)

#### AFTER HOURS INDEX

##### Quicken 2.0

A powerful, affordable, easy-to-use checkbook manager

##### Business Week Mutual Fund Scoreboard

Help in making wise investments

##### Solitaire Royale

Eight different varieties of the popular card game

##### HoroScopies II

Charting your course by the stars

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More importantly, we configure this system unit to your exact needs, then burn-in everything, add-in boards and all, to make sure the entire system works perfectly. And to keep it working perfectly, we give you Dell toll-free technical support and a full year of on-site service from Honeywell Bull-included in the system price. Plus a 30-day money-back guarantee and a one-year limited warranty. Also included in the low system price. And you buy direct from our manufacturing facility in Austin, Texas. Which eliminates dealer markups. For more details, look inside this gatefold. Then call 800-426-5150 to order a system set up just for you.



# THE INSIDE STORY. INSIDE.



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